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2019 Annual Environmental Review

Williamtown Sand Syndicate Pty Ltd

Williamtown Sand

Cabbage Tree Road, Williamtown

27 March 2020

2019 Annual Environmental Review

Williamtown Sand

Cabbage Tree Road, Williamtown

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Prepared for:

WILLIAMTOWN SAND SYNDICATE PTY LTD

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Contents

1.1 SCOPE 1
1.2 PURPOSE OF REPORT 1

2. PROJECT OVERVIEW 3
2.1 PROJECT SUMMARY 3
2.2 ENVIRONMENTAL SETTING 7
2.3 COMMUNITY OVERVIEW 11
2.4 DESCRIPTION OF DEVELOPMENT 11
2.4.1 Previous Operations 11
2.4.2 Activities performed during the Reporting Period 11
2.4.3 Development Proposed During Current Calendar Year 14

3. STATUTORY REQUIREMENTS 17
3.1 NSW DEVELOPMENT CONSENT 17
3.2 COMMONWEALTH APPROVAL 17
3.3 PERMITS AND LICENCES 17
3.3.1 Environment Protection Licence 17
3.3.2 Further Permits and Licences 17
3.4 LEGISLATION 18

4. ADMINISTRATIVE CONDITIONS 19
4.1 SCHEDULE 2 CLAUSE 18 – PRODUCTION DATA 19
4.2 SCHEDULE 2 CLAUSE 21 – CONTRIBUTIONS TO COUNCIL 19

5. MONITORING RESULTS 20
5.1 WATER MONITORING 20
5.1.1 Regulatory Requirements 20
5.1.2 Water Monitoring Summary Report 20
5.1.3 Water Monitoring Network 21
5.1.4 Groundwater Levels 23
5.1.5 Water Quality 24
5.1.6 Data Trends Over Life of Project 25
5.2 NOISE MONITORING 26
5.2.1 Noise Data Trends Over Life of Project 26
5.2.2 Noise Complaints 26
5.1 AIR QUALITY 27
5.1.1 Regulatory Requirements 27
5.1.2 Air Quality Monitoring Network 27
5.1.3 Air Quality Criteria 29

5.1.4 Review of Air Quality Results 29
5.1.5 Exceedance Investigations 31
5.1.6 Air Quality Complaints 32

6. SCHEDULE 2 CLAUSE 48 – REVIEW OF PFAS EXPOSURE PATHWAYS 33

7. ENVIRONMENTAL PERFORMANCE 34

7.1 AREA CLEARED 34
7.2 REHABILITATION 35
7.2.1 Areas of Topsoil Application and Depth 35
7.2.2 Weed Control 37
7.3 WASTE MANAGEMENT AND MINIMISATION 37
7.4 WATER USE 37
7.5 PEST MANAGEMENT 38
7.6 FAUNA INCIDENTS 38
7.7 ENERGY EFFICIENCY 38
7.7.1 Diesel and Electricity Use 38
7.7.2 Review of Opportunities to Improve Energy Efficiency 38
7.8 HERITAGE MANAGEMENT 39
7.8.1 Aboriginal Heritage 39
7.8.2 Historic Heritage 39
7.9 INDEPENDANT ENVIRONMENTAL AUDIT 39

8. COMMUNITY 40

8.1 COMMUNITY CONSULTATIVE COMMITTEE 40
8.2 NEWSLETTERS 40
8.3 COMPLAINTS RECORDS 40

9. NON-COMPLIANCES 45

10. DEVELOPMENT IMPACT PREDICTION DISCREPANCIES 46

11. IMPROVEMENT 47

11.1 REVISION OF STRATEGIES, PLANS & PROGRAMS 47

Tables

Table 1: Key Aspects of the Cabbage Tree Road Sand Project. 3
Table 2: NSW and Commonwealth legislation applicable to the Project..... 18
Table 3 Construction noise monitoring – LAeq(15min)..... 26
Table 4 Air Quality Criteria..... 29
Table 5: BAM monitoring results from 15 July to 31 December 2019 31
Table 6: BAM Exceedance Investigations..... 32
Table 7 Complaints Received by WSS during the reporting period 41
Table 8 Complaints Received by DPIE the reporting period..... 43

Figures

Figure 1: Resource and sequence plan 6
Figure 2: Monthly average rainfall, evaporation, minimum and maximum temperatures recorded at Williamtown Airport weather station 9
Figure 3 Subject Land and Receptors..... 10
Figure 4: Construction Areas 13
Figure 5 Water Monitoring Network - Monitoring Locations..... 22
Figure 6 2019 Monthly Rainfall Totals (Williamtown RAAF) 23
Figure 7 Monthly Groundwater Elevation 24
Figure 8: Air Quality Monitoring Network Locations..... 28
Figure 9: HVAS (PM10) sample results from 14 September to 31 December 2019 30
Figure 10: HVAS (TSP) sample results from 14 September to 31 December 2019..... 30
Figure 11 Topsoil Stockpiles and Extent of Clearing during the reporting period..... 36

Appendices

Appendix 1. Project Approval
Appendix 2. EPL
Appendix 3. Community Consultative Committee Minutes
Appendix 4. Newsletters
Appendix 5. Groundwater Summary Report
Appendix 6. RAP Inspection Records
Appendix 7. DPIE Correspondance
Appendix 8. Construction Noise monitoring Report
Appendix 9. PFAS Exposure Pathways Review

1.1 SCOPE

Schedule 5 Condition 11 of Development Consent SSD-6125 requires an Annual Review (AR) of the environmental performance of Cabbage Tree Road Sand Quarry. This AR has been prepared for the Cabbage Tree Road Sand Quarry to report on environmental performance in the calendar year 1 January 2019 – 31 December 2019.

This AR will be distributed to the NSW Department of Planning, Industry and Environment (DPIE), Hunter Water Corporation (HWC) and Port Stephens Council (PSC) and will also be provided to the Community Consultative Committee (CCC) and made publicly available on Newcastle Sands website.

1.2 PURPOSE OF REPORT

On 9 of May 2018, Development Consent SSD-6125 was approved under Section 4.38 of the *Environment Planning and Assessment Act 1979* (EPA Act 1979).

Schedule 5 Condition 11 of SSD-6125 requires that:

By the end of March each year, or other timing as may be agreed by the Secretary, the Applicant must submit a review to the Department reviewing the environmental performance of the development to the satisfaction of the secretary. This review must:

a) *Describe the development (including any progressive rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year.*

b) *Include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:*

- *Relevant statutory requirements, limits or performance measures/criteria;*
- *Requirements of any plan or program required under this consent;*
- *Monitoring results of previous years; and*
- *Relevant predictions in the documents listed in condition 2(a) of Schedule 2;*

NEWCASTLE SAND

c) *Identify any non-compliance over the past calendar year, and describe what actions were (or are being) taken to ensure compliance;*

d) *Identify any trends in the monitoring data over the life of the development;*

e) *Identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*

f) *Describe what measures will be implemented over the current calendar year to improve the environmental performance of the development.*

2. PROJECT OVERVIEW

2.1 PROJECT SUMMARY

The key details of the Project are shown in **Table 1** with the general arrangement and resource extent shown by **Figure 1**.

Table 1: Key Aspects of the Cabbage Tree Road Sand Project.

Aspect	Key Aspects of the Project
Key elements	Sand quarry extracting up to 530,000 tonnes per annum over a period of 6 to 15 years including the construction of an intersection with Cabbage Tree Road, sealed and gravel access roads, site office, workshop and weighbridges. Progressive rehabilitation of quarried land returning to native vegetation communities with potential future use of the facilities area.
Location	398 Cabbage Tree Road, Williamtown, within the Port Stephens local government area.
Property Titles	Four titles within the Parish of Stockton, County of Gloucester including: • Lot 1 DP 224587 at 398 Cabbage Tree Road, Williamtown • Lot 121 DP 556403 at 282B Cabbage Tree Road, Williamtown. • Lot 11 DP 629503 at 282A Cabbage Tree Road, Williamtown. • Lot 1012 DP 814078 at 282 Cabbage Tree Road Williamtown.
Land Owner	Port Stephens Shire Council under lease to Williamtown Sand with royalty of up to $17.5 million over the Project life.
Area	Total Project Area of approximately 42.3 hectares from a Subject Land Area of approximately 176.2 hectares.
Proponent	Williamtown Sand Syndicate Pty Ltd, the owner of the quarry operator Newcastle Sand.
Stakeholders	Key stakeholders include: • Adjacent landowners and local community • NSW Planning & Environment (DPE) • NSW Office of Environment & Heritage (OEH) • NSW Department of Primary Industries – Office of Water • Hunter Water Corporation (HWC) • Port Stephens Council (PSC) • Commonwealth Department of Environment. Copies of correspondence by these stakeholders regarding the required content for this document is included within **Appendix 2.**
Project Life	Up to 15 years. At expected demand the quarry will have an eight (8) year life, or six (6) years at maximum extraction rates.
Extraction Rate	Maximum of 530,000 tonnes per annum, and maximum daily rate of 3,000 tonnes.

Aspect	Key Aspects of the Project
Operating Hours	Construction of intersection, access and workshop and office: • 7:00am to 5:00pm Monday to Friday. • 8:00am to 1:00pm Saturday. • No works on Sunday or public holidays. Quarrying Operations: • 7:00am to 5:00pm Monday to Friday. • 7:00am to 4:00pm on Saturday. • No quarrying on Sunday or a Public Holiday. Loading and dispatch of trucks: • 6:00am to 6:00pm Monday to Friday. • 7:00am to 4:00pm Saturday. • No works on Sunday or public holidays.
Transport Rate	• Up to 6 laden trucks per hour (12 trips per hour) during the hours of 6 am to 7 am Monday to Friday. • Up to 10 laden trucks per hour (20 trips per hour) during hours of 7 am to 6 pm Monday to Friday (i.e. all haulage hours excluding the morning peak). • Up to 10 laden trucks per hour (20 trips per hour) during hours of 7 am to 4 pm Saturdays. • Haulage between 5 am and 6 am is subject to agreement from adjacent landowners as per Schedule 3, Condition 1. • Up to 6 vehicles of employees would be expected to arrive from approximately 5:30 am to 7 am and leave between 5 pm and 7 pm.
Quarry Access	Upgrade of existing property access to a left in left out intersection with deceleration and acceleration lanes. Incoming speed limits of: • 40 km/h from Cabbage Tree Road to the weigh bridge. • 20 km/h from weigh bridge to processing plant and extraction face. Outgoing speed limits of: • 20 km/h from processing plant and extraction face to weigh bridge. • 60 km/h weigh bridge to Cabbage Tree Road.
Resource and products	Approximately 3.25 Mt of sand, comprising the following products to be extracted from site by truck onto Cabbage Tree Road for transport to markets: • Raw fill sand. • Screened sand. • Sandy loam. • Concrete sand. • Glass sand (estimated at about 16% of total resource). The Project covers approximately 42.3 hectares (including access roads) with extraction to a depth of not more than 1m above the highest predicted groundwater level.
Extraction	• Maximum extraction rate of 530,000 tonnes per annum. • Excavator and/or bulldozer to clear vegetation and strip topsoil. • Bulldozer or grader to windrow sand. • Front-end loader to feed conveyors to convey sand to the processing plant. • Front-end loader and haul truck to convey sand when conveyor unsuitable.
Processing Methods	• Raw sand product extracted directly from face with no processing. • Sand fed into electrically powered screen. • Screened sand sold as product or fed to electrically powered air separator. • Products stockpiled for loading directly into truck or fill bulker bags for removal from the site by truck.

Aspect	Key Aspects of the Project
Support facilities and utilities	• Site office, workshop, stores, car parking. • Power supply from local network • Water supply from local network.
Water demand and supply	• Water required for stockpile dust suppression and gravel haul road dust suppression. • Water sourced from mains supply fed into the site from Cabbage Tree Road. • Rainwater tanks at office and workshop area to collect rainwater from rooved areas for use in dust suppression. • Water demand estimated at less than 140KL per annum. • No groundwater use. • No capture or storage of surface runoff.
Employment	Full time staff for up to six persons. Opportunities for approximately 20 contract and customer truck haulage operators.
Community and amenity	The following measures are proposed to mitigate and offset adverse impacts to the community: • Up to $17.5 million over the Project life in royalty payments to Port Stephens Council. • A 20 m vegetated buffer from Cabbage Tree Road to minimise visual impacts for passing motorists and adjacent residents. • A 75m long road side buffer of retained vegetation along the sides on the access from Cabbage Tree Road. • Real time triggers on air quality monitors to manage potential air quality impacts. • Six monthly attended noise monitoring and noise model confirmation based on actual data prior to extraction of areas 8, 9 or 10 (estimated at Year 6).
Biodiversity Offset Strategy	A biodiversity offset strategy that incorporates: • The in-perpetuity conservation of the remaining subject land, through the establishment of a Biobank Site. • Purchase and retirement of additional Koala species credits, as required to meet credit requirements at the impact site. • Reinstatement of lost hollows with suitable nest boxes within rehabilitation area at a ratio of one to one. • Long term conservation and security of the majority of the rehabilitated lands.

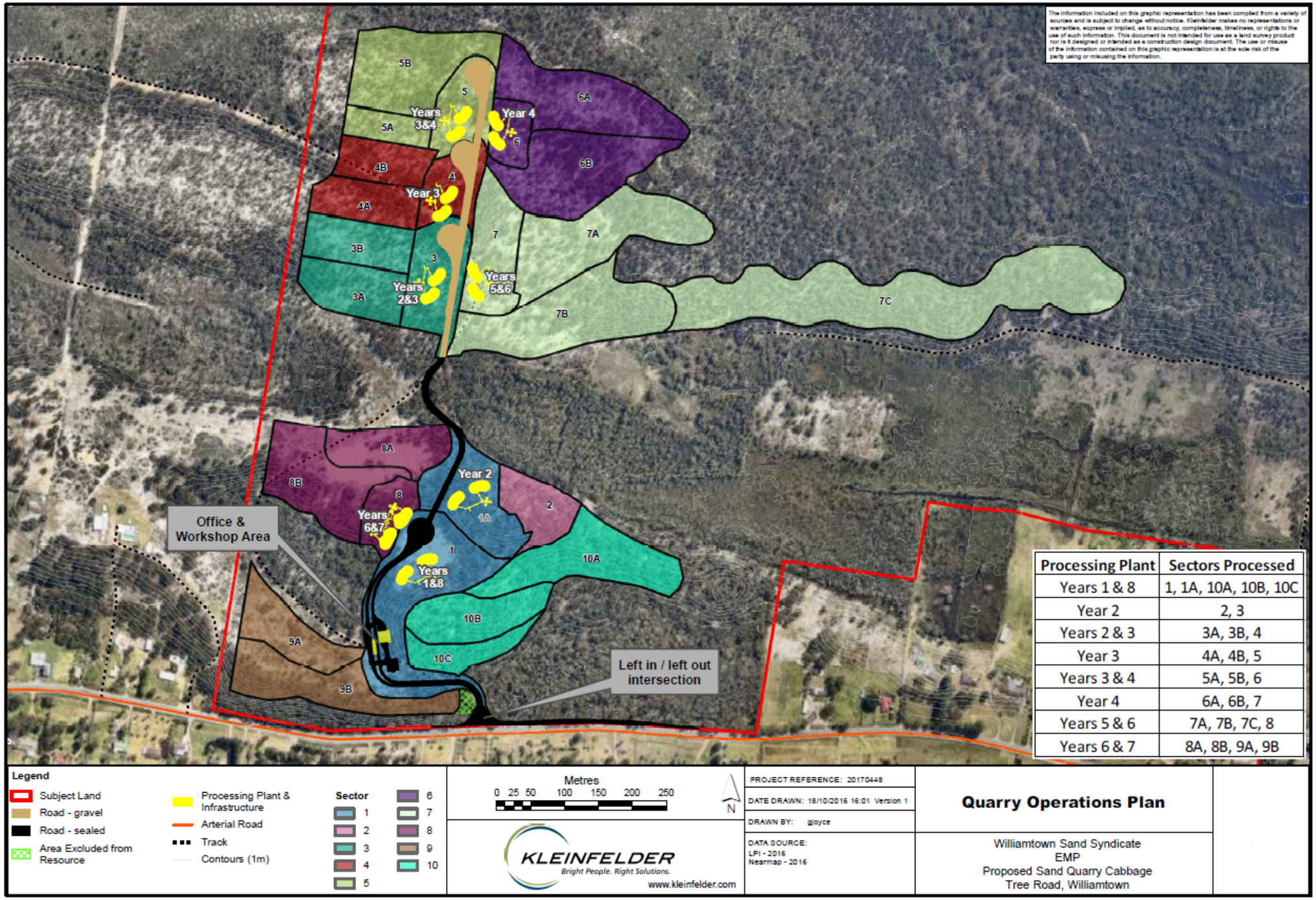

Figure 1: Resource and sequence plan

2.2 ENVIRONMENTAL SETTING

Key environmental attributes of the subject land and surrounds are:

- **Landform**
  - The site is located on the southern margin of an inner coastal dune barrier system and involves the removal of vegetated Pleistocene age sand dunes that adjoin the Holocene age swamp and tidal margins of Fullerton Cove to the south (Umwelt 2015).
  - Broadly, the landform comprises a gently sloping plain from 3 m AHD in the south to 5.5 m AHD in the north with a two prominent sand dunes reaching up to 17 m AHD elevation, separated by low lying swamp area of 2 m AHD that drains to the east.
- **Water**
  - The majority of the Project is above the Tomago sand beds (a source for up to 25% of Newcastle's water supply) and as such is within the Hunter Water designated special area under the Hunter Water Regulation 2010.
  - The subject land does not contain any defined natural drainage lines, suggesting vertical infiltration into the sand is dominant over runoff and horizontal movement of water.
  - The area surrounding the Project Area is frequently water logged during high rainfall, with the groundwater close to the surface.
  - The area lies just inside the boundary of PFAS management zones, necessitating diligence in groundwater management.
- **Ecology**
  - The low-lying Swamp mahogany – paperbark community is listed as an endangered ecological community protected under NSW legislation.
  - The subject land contains preferred and supplementary Koala habitat.
  - The Project area and subject land comprises threatened flora Earp's Gum and Camfield's stringybark protected under State and Commonwealth legislation.
- **Weather**
  - Weather data is available at the Bureau of Meteorological Station located at the Williamtown Airport approximately 4 km to the north east of the northern portion of the
  - Summer mornings have light variable vectors that are slightly dominant from the south, until morning vectors through Autumn strengthen from the north west and west and become dominant right through the year until November.
  - Summer afternoon vectors are typical of the coastal location with strong onshore winds from the south, south east and east. As winter approaches vectors from the west and north west increase, before westerly and north westerly vectors become dominant. By spring south easterly vectors increase in in dominance during the lead in to summer.
  - The most sensitive time of year for the Project is likely to be during winter north westerly vectors dominate throughout both morning and afternoon periods .
  - **Figure 2** illustrates long term average temperature, evaporation and rainfall data from the Williamtown Airport Bureau of Meteorological Station.
  - Evaporation rates are highest during summer, and are greater than the rate of rainfall. The evaporation rate is similar or less than rainfall rate during the months May, June and July.

- The driest month on average is September, with the wettest in June.

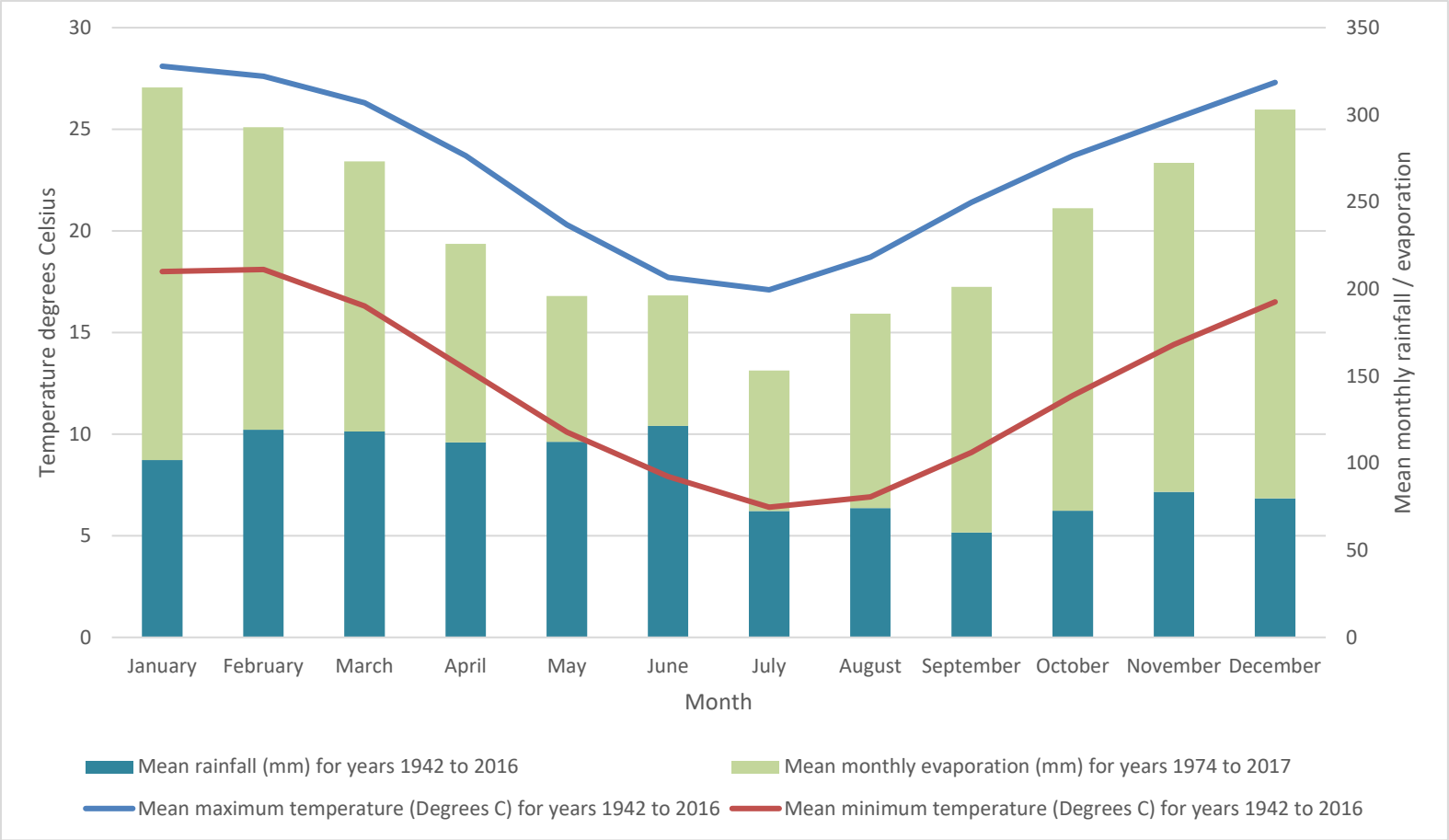

Figure 2: Monthly average rainfall, evaporation, minimum and maximum temperatures recorded at Williamtown Airport weather station

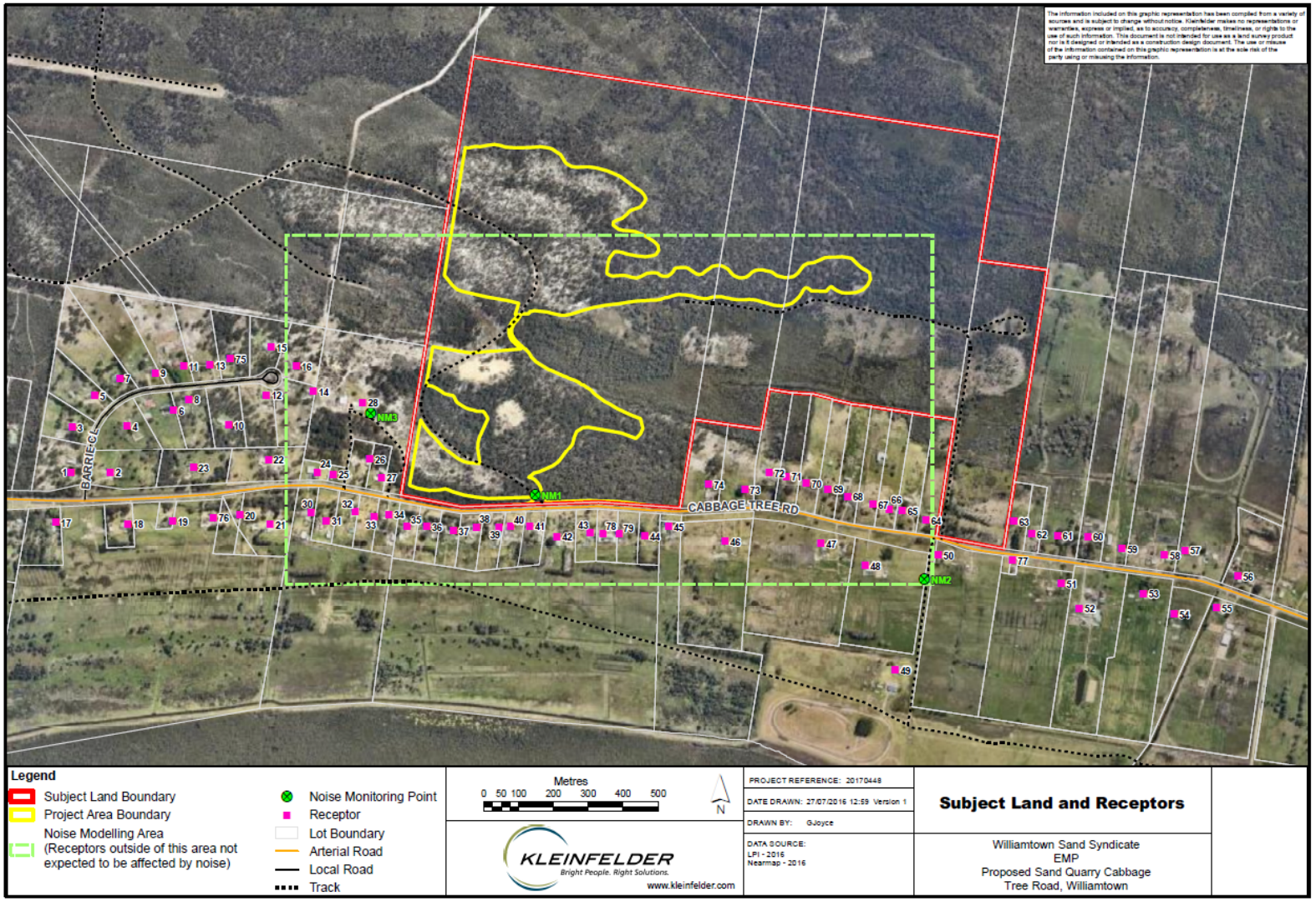

Figure 3 Subject Land and Receptors

2.3 COMMUNITY OVERVIEW

Dwellings surrounding the subject land comprise:

- No dwellings located to the north.
- East: closest dwelling is 244 m. 15 dwellings are located within 1,000 m to the east and north of Cabbage Tree Road.
- South: closest dwelling is 61 m. 29 dwellings are located within 1,000 m to the south and south of Cabbage Tree Road.
- West: closest dwelling is 83 m. 24 dwellings located within 1,000m to the west and north of Cabbage Tree Road.
- Majority of dwellings located below 3 m AHD.
- The subject land and properties immediately surrounding the area are located within the red zone for the RAAF PFAS contamination. It is noted that a low concentration contamination plume extends over only a portion of the site and some residences south and east of the Project.

Refer to **Figure 3** for locations of receptors surrounding the Project.

2.4 DESCRIPTION OF DEVELOPMENT

The development commenced construction on 14 August 2019 and remained in the construction phase for the duration of the reporting period. Construction areas are demonstrated in **Figure 4**.Figure 3 Subject Land and Receptors

The Project is currently still in the construction phase and is expected to commence extractive activities in Q2 2020.

2.4.1 Previous Operations

The Project commenced on 14 August 2019, as such this is the first reporting period for the Project.

2.4.2 Activities performed during the Reporting Period

No *'Quarrying Operations'* as defined by the Development Consent occurred during the reporting period (2019 calendar year) with the project in construction phase. Construction commenced on 14 August 2019. While sand was excavated during the construction activities and stockpiled for future use, no material was processed or transported out the gate during the reporting period.

During the reporting period the following construction activities were performed:

- Clearing of vegetation for development (discussed in Section 7.1)
- Earthworks for infrastructure development including:
  - Intersection with Cabbage Tree Road.
  - Topsoil batters
  - Excavation for pads for office area and operator compound.
  - Stockpiling of raw bulk excavated material for future use
- Commencement of building of within the Stage 1 clearing area including:
  - Access Roads
  - Office Area
  - Operators Compound
  - Weighbridge
  - Workshop area
  - Security camera installation
  - Irrigation system for batters
  - Installation of Jersey kerb (**Plate 1** / **Plate 2**).
- Rehabilitation activity to occur during the reporting period was the re-spreading of topsoil as described in Section 7.2.1 and the placement of cleared vegetation for ground stabilisation (See **Plate 1** / **Plate 2**) . As no *'Quarrying Operations'* have yet commenced, progressive rehabilitation associated with such activity has not yet begun.

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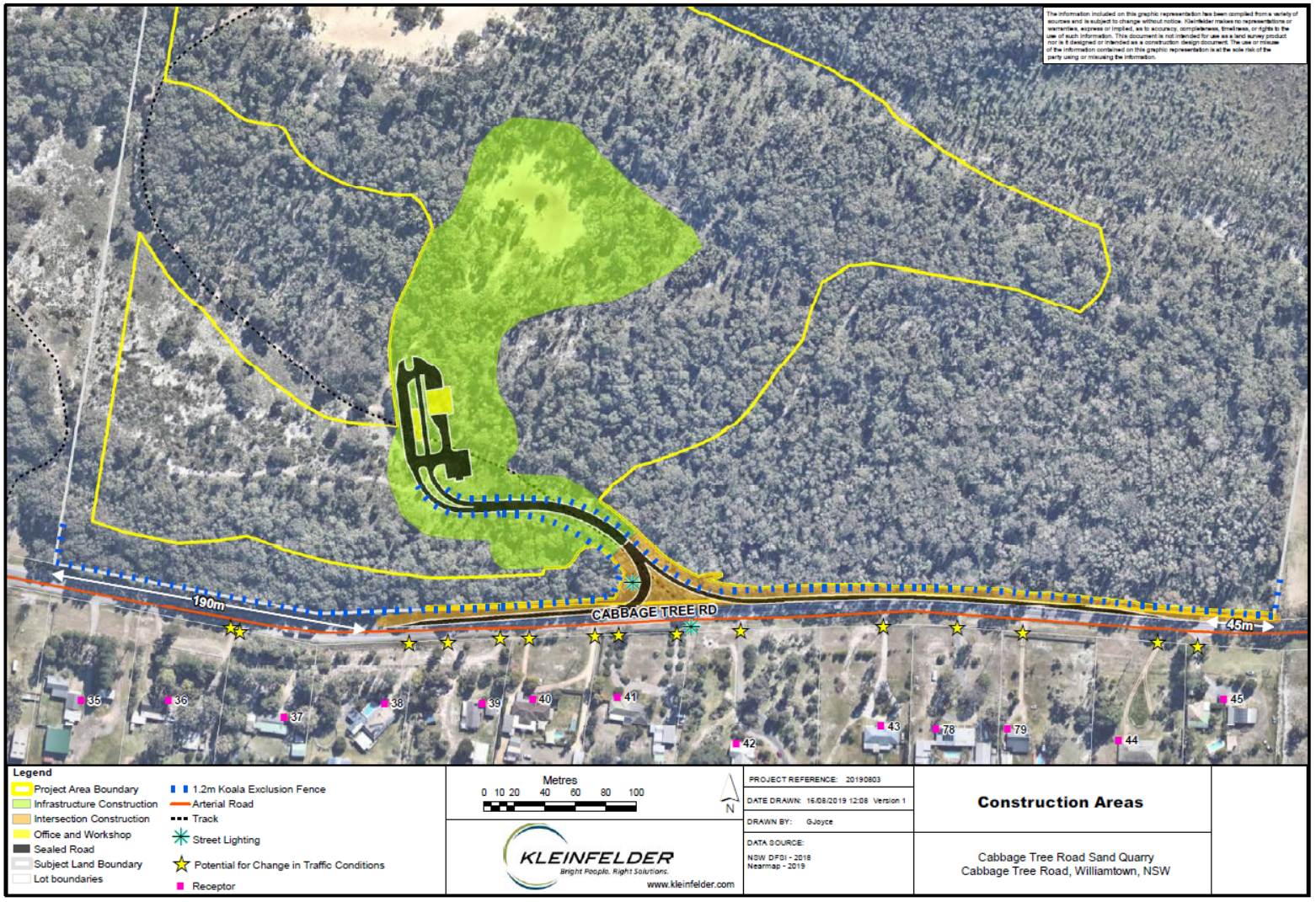

Figure 4: Construction Areas

2.4.3 Development Proposed During Current Calendar Year

Throughout the current calendar year (2020) the development will move from the construction phase into 'Quarrying Operations'. This transition is expected to occur in May 2020. Extraction will commence and occur within the Stage One clearing area shown in **Figure 1**.

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Plate 1 Jersey Kerb Installation and Cleared Vegetation ground stabilisation looking into site

Plate 2 Jersey Kerb Installation and Cleared Vegetation ground stabilisation looking from site to exit gate

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3. STATUTORY REQUIREMENTS

3.1 NSW DEVELOPMENT CONSENT

Project Approval was granted under the *Environmental Planning and Assessment Act 1979* by the NSW Independent Planning Commission on 9 May 2018 subject to Development Consent SSD-6125 conditions (Appendix 1).

3.2 COMMONWEALTH APPROVAL

Commonwealth Approval was granted on 12 December 2018 to undertake the project. Conditions of the approval are based largely on the NSW approval with some additional checks and to ensure compliance.

3.3 PERMITS AND LICENCES

3.3.1 Environment Protection Licence

Environment Protection Licence (EPL) 21264 has been issued by the NSW Environment Protection Authority (EPA) under the *Protection of Environment Operations Act 1997*. Pursuant to Schedule 1, Clause 16 “Crushing, grinding or separating” and Clause 19 “Extractive activities”.

3.3.2 Further Permits and Licences

The following permits and licences are required and in place to construct and operate the quarry:

- Permit under Section 138 of the *Roads Act 1993* from PSC / RMS.
- Hunter Water agreement to undertake extractive industries within the Tomago Special Area.
- Lease for the land with Port Stephens Council.

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3.4 LEGISLATION

In addition to specific requirements referred to project approvals and licences, the Project is to be conducted in accordance with all relevant Commonwealth and New South Wales legislation outlined in **Table 2**.

Table 2: NSW and Commonwealth legislation applicable to the Project.

Act	Jurisdiction
Environment Protection and Biodiversity Conservation Act 1999	Commonwealth
Environmental Planning and Assessment Act 1979	New South Wales
Biodiversity Conservation Act 2016	New South Wales
Biosecurity Act 2015	New South Wales
Protection of the Environment Operations Act 1997	New South Wales
Roads Act 1993	New South Wales
Waste Avoidance and Resource Recovery Act 2001	New South Wales
Water Management Act 2000	New South Wales

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4. ADMINISTRATIVE CONDITIONS

4.1 SCHEDULE 2 CLAUSE 18 – PRODUCTION DATA

Throughout the reporting period no extraction of quarrying products occurred so no production data is available. WSS estimate production to commence in April 2020, with first dispatch of material from site anticipated for May 2020.

4.2 SCHEDULE 2 CLAUSE 21 – CONTRIBUTIONS TO COUNCIL

The project was in the construction phase only during the reporting period. No Construction Certificates have been required for the earthworks and installation associated with temporary structures which construction has been limited to, therefore no Contributions were required during the reporting period.

5. MONITORING RESULTS

5.1 WATER MONITORING

Throughout the reporting period baseline water monitoring data was being collected to inform the impacts of Quarrying Operations once they commence in 2020.

5.1.1 Regulatory Requirements

Water monitoring is managed by the approved Soil and water Management Plan required by the Development Consent.

5.1.2 Water Monitoring Summary Report

As per the requirement of the Soil and Water Management Plan, groundwater monitoring has been performed over a 12-month period throughout 2019 to provide baseline data by which to assess the impacts of Quarrying Operations. Upon completion of 12 months of water monitoring and analysis the results have been reviewed and compiled within a Baseline Summary report (available in Appendix 5) documenting the following keys aspects:

- Statistical distribution of sampling results at each location.
- Sites with potential to be influenced by initial construction activities, and comparison to other monitoring sites.
- Statistical distribution of sampling results considered to be unaffected by construction.
- Trend analysis using Man Kendall software.
- Comparison of results with accepted water quality guidelines, including:
    - Australian and New Zealand Environmental Conservation Council (ANZECC) Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 triggers for slightly disturbed ecosystems.
    - National Health and Medical Research Council Australian Drinking Water Guidelines 2018 and HEPA NEMP (2018).
- Document trigger values for use in evaluation of ongoing monitoring data.
- Comment on suitability of sites, frequency and analytes for ongoing monitoring.

The findings of the report are summarised below throughout Section 5.1.3 to 5.1.6. The full report is available in Appendix 5.

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5.1.3 Water Monitoring Network

Water monitoring was initiated in February 2019 and continued each month for a duration of 12 months until January 2020. Sampling times were generally consistent, undertaken each time within the middle of the month (between the 11th and 18th of the month). Within the first two monitoring rounds (February and March) re-insertion of PVC piping was required at fire effected location BH1 and for root bound effected location BH12.

The water monitoring network is presented in **Figure 5**

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Bore ID	GDA 1994 MGA Zone 56		Water Level	Note
	Easting	Northing		
BH1	387741	6369496	Dip	
BH2	387705	6369175	Logger	Down-gradient monitoring site
BH3	387752	6368964	Logger	
BH4	387855	6368743	Logger	Down-gradient monitoring site
BH5	388769	6369335	Dip	
BH6	388730	6369582	Dip	Up-gradient control site
BH7	388828	6369245	Dip	Down-gradient monitoring site
BH8	389178	6369272	Dip	
BH9	387520	6368799	Dip	Down-gradient monitoring site
BH10	387931	6369744	Dip	
BH11	387651	6369980	Logger	Up-gradient control site
BH12	388203	6369333	Dip	
MW239S	388619	6369307	Logger	Down-gradient monitoring site
SW1	387887	6368734	Marker post	Pond
SW2	387988	6369234	Marker post	Pond
SW3	388465	6369057	Marker post	Channel
SW4	389049	6368969	Marker post	Channel
SW5	388248	6368707	Culvert depth	High rainfall only

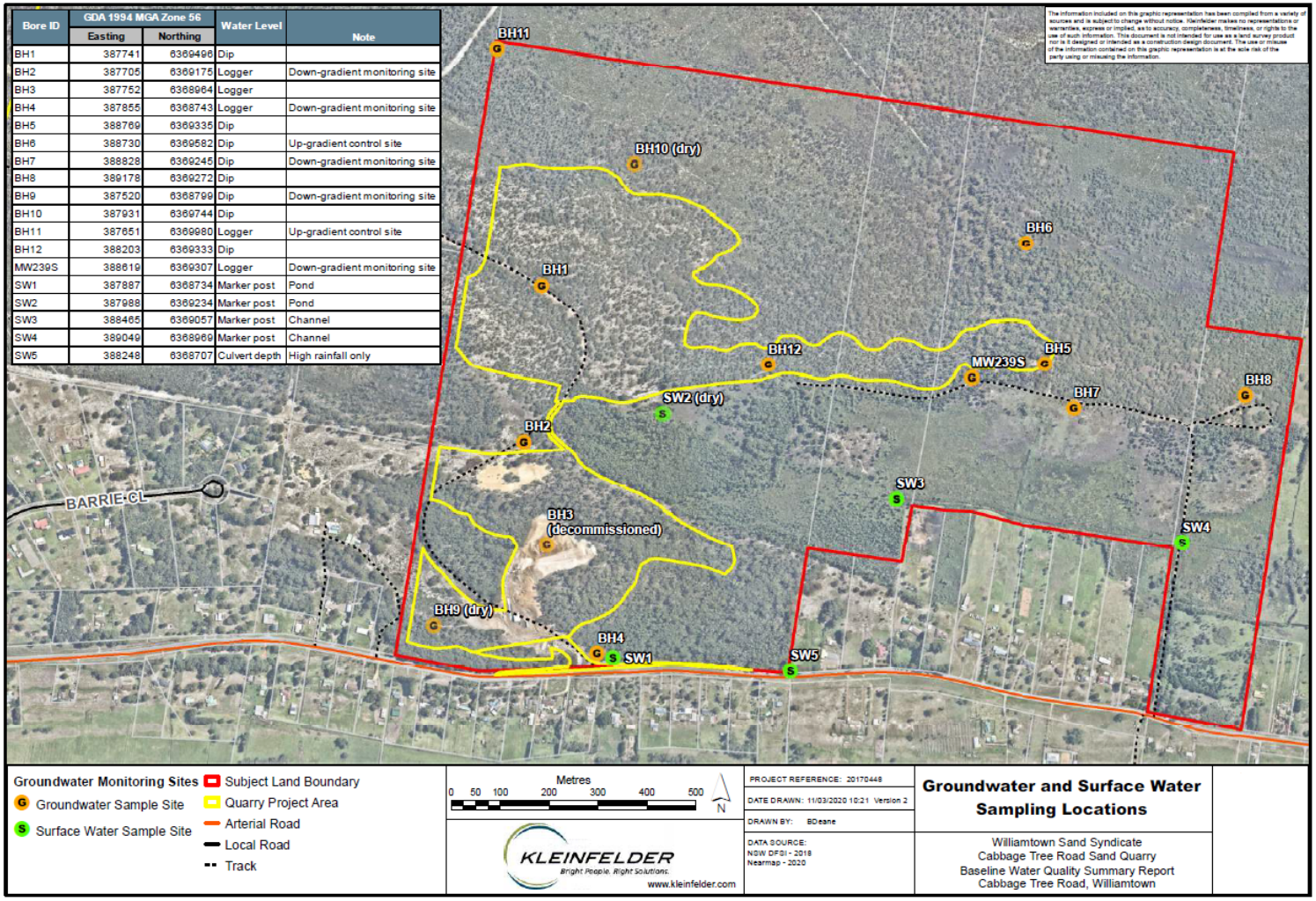

Figure 5 Water Monitoring Network - Monitoring Locations

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5.1.4 Groundwater Levels

Groundwater throughout the sampling locations demonstrated a general decline in elevations throughout the 12-month period. Most notably the greatest decline in groundwater elevations was observed in the months following the November 2019 water monitoring event which correlate directly with a significant decrease in rainfall from the mean average and increase in temperatures. **Figure 6** presents the monthly rainfall recorded at Williamtown RAAF, **Figure 7** provides a graphical representation of groundwater elevation identified during while gauging at each location.

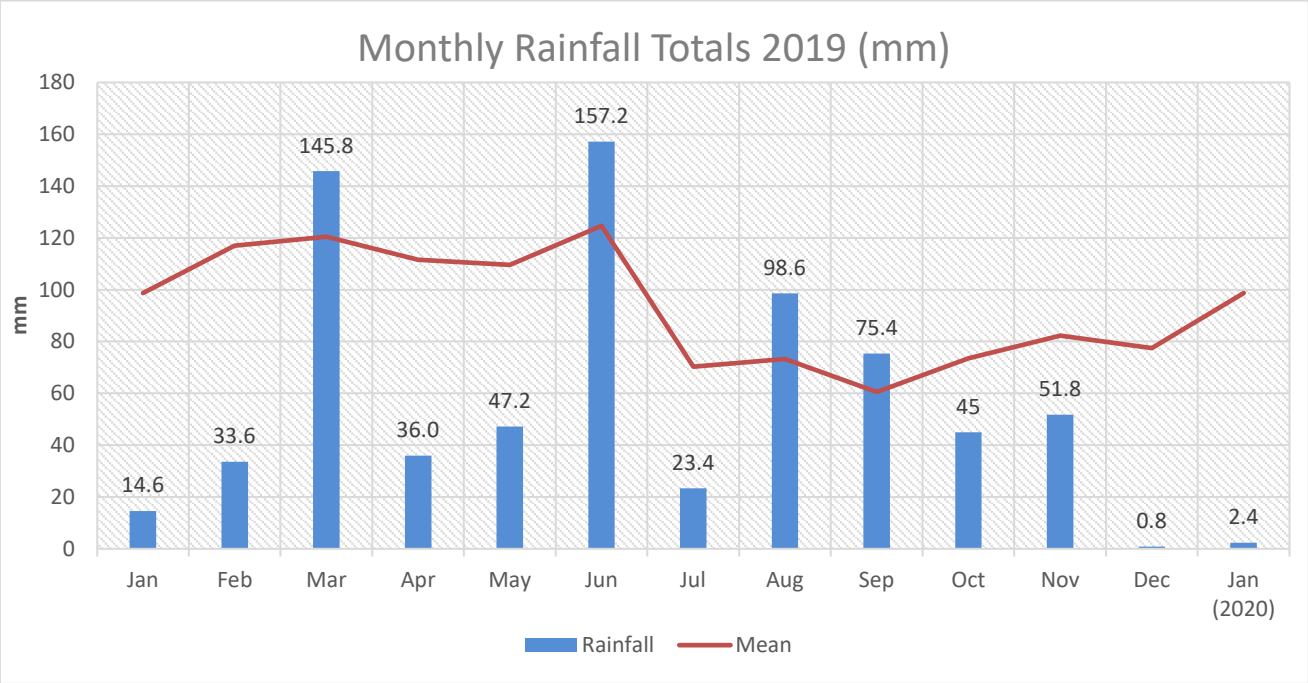

Figure 6 2019 Monthly Rainfall Totals (Williamtown RAAF)

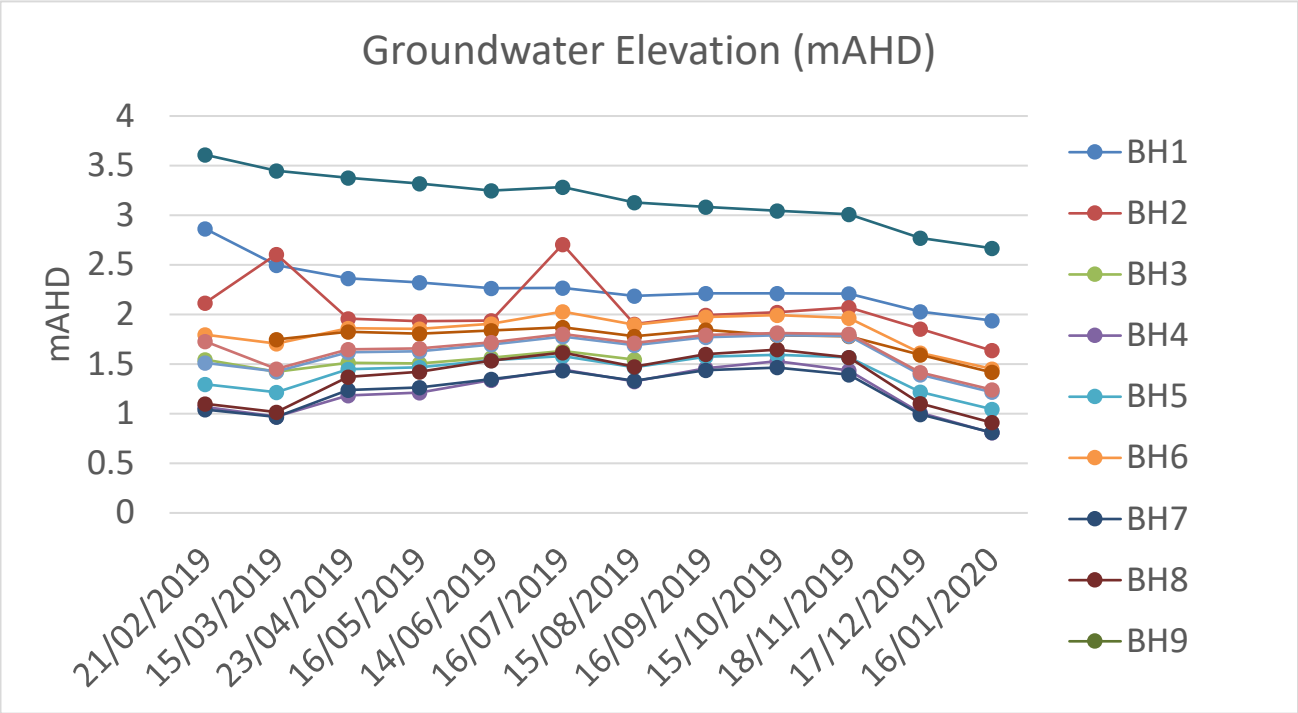

Figure 7 Monthly Groundwater Elevation

5.1.5 Water Quality

The analytical results available in Appendix 5 indicate that metals, namely barium, chromium, copper, iron manganese, nickel and zinc, were detected regularly throughout the monitoring period, and at the majority of the sample locations, indicating likely natural background concentrations. Iron concentrations were typically higher at BH1 throughout the baseline monitoring program which are likely indicative of concentrations in this area.

BTEXN, TPH and TRH were generally not detected across the majority of the Site with the exception of BH1 and BH4. At the initiation of the baseline sampling program in February 2019 BH1 was refitted with a PVC pipe to replace a previously fire damaged one. In the process an acrylic adhesive was applied to fuse the pipes together which likely initiated increased concentrations of TPH C6 - C9 (1,710µg/L) and TRH C6 - C10 (1,690µg/L) within the well. The subsequent months following reinstallation of the well concentrations of TPH and TRH fell to below LOR.

Concentration of hydrocarbons detected at BH4 are most likely influenced by the adjacent Cabbage Tree Road. Concentrations were detected following some form of rainfall in the

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region and ongoing detections are likely given the location of BH4 being in close proximity to a relatively busy carriageway. Ongoing monitoring of hydrocarbons is recommended, for due diligence purposes, given the potential likelihood for spills to occur from operational vehicles.

PFAS detections above LOR were recorded at locations BH4, BH6 and SW4. Concentrations of PFAS identified at BH6 and SW4 are likely sourced from an upgradient source from the Site, namely the Williamtown RAAF Base where historical use of PFAS containing materials have been used. A review of such PFAS pathways is available in Appendix 9. PFAS identified at location BH4, and directly adjacent to Cabbage Tree Road, is likely to have occurred from a different historical source.

5.1.6 Data Trends Over Life of Project

As discussed in Section 5.1.2 this report provides the initial annual monitoring results. As such there are no previous years to compare a trend to beyond the discussion provided in Appendix 5 for the 2019 calendar year.

It should also be noted that the Project site and regional area has experienced a significant drought over the past couple of years and this may have a bearing on groundwater and surface water conditions should significant rainfall reoccur in the region.

5.2 NOISE MONITORING

Noise monitoring events have occurred as per the requirements of the construction management plan. Two noise monitoring events occurred during the reporting period. The results which demonstrate compliance with the criteria are presented in **Table 3**, with the accompanying report provided in Appendix 8 .

As per Schedule 3 Clause 3 of the project approval, the noise criteria for the project excludes road construction activities associated with the intersection of the quarry access road and Cabbage Tree Road, where a criteria of .48 – 51 dB(A) is considered noise affected, and greater than 75 dB(A) is highly noise affected. Table 3 and Appendix 8.

Appendix 8 demonstrates neither of these criteria were exceeded during the construction noise monitoring events.

Table 3 Construction noise monitoring – LAeq(15min)

Date	Time	TOTAL (dB)	Traffic (dB)	Other identified (dB)	Sand mine (source (dB))	Criterion (dB)	Comply (Y/N)
23/11/2019	1:04 PM	59	59	N/A	35 (reverse alarms)	43	Y
18/12/2019	12:30 PM	61	61	Wind (41)	25 (revs, rev. alarms)	43	Y

5.2.1 Noise Data Trends Over Life of Project

The construction phase commenced on 14 August 2019. As such this AEMR presents the first noise monitoring data to be recorded. A trend over the life of the project cannot yet be identified, however the reporting period provides life of project monitoring to date and resulted in compliance with noise management requirements.

5.2.2 Noise Complaints

No complaints were received regarding noise during the reporting period.

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5.1 AIR QUALITY

This section addresses compliance with the approved Air Quality Management Plant (AQMP) required by Condition 9 of Schedule 3 of the Development Consent (SSD-6125). While quarrying did not occur during the reporting period with only construction activities occurring, the monitoring network has been established at the earliest feasible opportunity, prior to the commencement of quarrying onsite to better establish site-specific background conditions as per the commitment within the AQMP. Air monitoring commenced on 14 September 2019.

5.1.1 Regulatory Requirements

Air Quality is governed by the regulatory approved AQMP. The AQMP provides a formal framework for ongoing monitoring of air quality at the site to manage the potential impact of sand extraction on air quality.

5.1.2 Air Quality Monitoring Network

The air quality monitoring network comprises of the following key components:

- Two Beta Attenuation Monitors (BAM) real-time compliance monitors (RT1 and RT2) measuring PM_{10} installed between the quarry and dwellings to the south and west of the quarry. Each real-time monitor is fitted with wind direction sensors to enable contributions from the quarry to be better determined.
- A High-Volume Air Sampler (HVAS) with a PM_{10} inlet is located to the east of the quarry.
- A HVAS measuring TSP is located to the south of the quarry, adjacent to RT2.

The network has been established prior to the commencement of quarrying onsite to better establish site-specific background conditions.

Locations of the installed air quality monitoring units are provided in **Figure 8.**

WSS utilise local meteorological data to observe current and predicted wind speed and direction data and also generate site specific meteorological data records. In addition, Weatherzone alerts were trialled during the reporting period but were found to be unreliable. The current method is to access Bureau of Meteorology forecasts on a daily basis to allow preparedness for elevated wind and potential air quality control requirements.

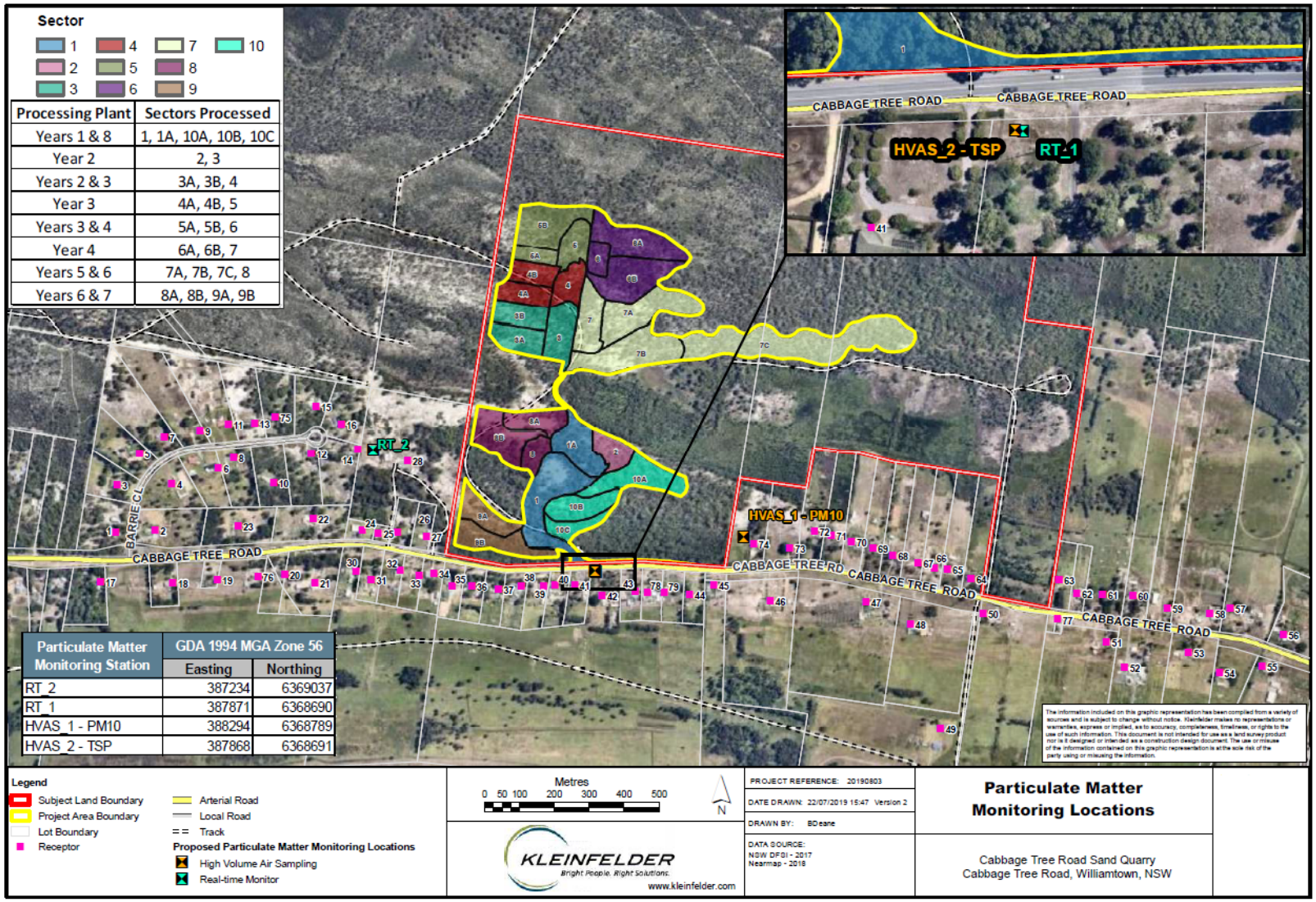

Figure 8: **Air Quality Monitoring Network Locations**

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5.1.3 Air Quality Criteria

The air quality criteria for the Cabbage Tree Road Sand Quarry are presented in Table 4.

Table 4 Air Quality Criteria

Pollutant	Averaging Period	Criteria*
Particulate matter < 10 µm (PM_{10})	Annual	[a c] 25 µg/m^3
Particulate matter < 10 µm (PM_{10})	24-hour	[b] 50 µg/m^3
Total suspended particulates (TSP)	Annual	[a c] 90 µg/m^3

Where:

a – Cumulative impact (i.e. increase in concentrations due to the project plus background concentrations due to all other sources)

b – Incremental impact (i.e. increase in concentrations alone, with zero allowable exceedances of the criteria over the life of the project)

c – Excludes extraordinary events such as bushfire, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by DPIE.

* Based on standard air quality assessment criteria in the *Approved Methods for Modelling and Assessment of Air Pollutants in NSW 2007*

5.1.4 Review of Air Quality Results

Data represented below summarises the air quality monitoring results at each of the monitoring sites for the reporting period.

5.1.4.1 High Volume Air Samplers (HVAS)

Figure 9 and Figure 10 show the monitoring results for PM_{10} and TSP in µg/m^3/day (24 hours) for each of the monitoring locations during the reporting period.

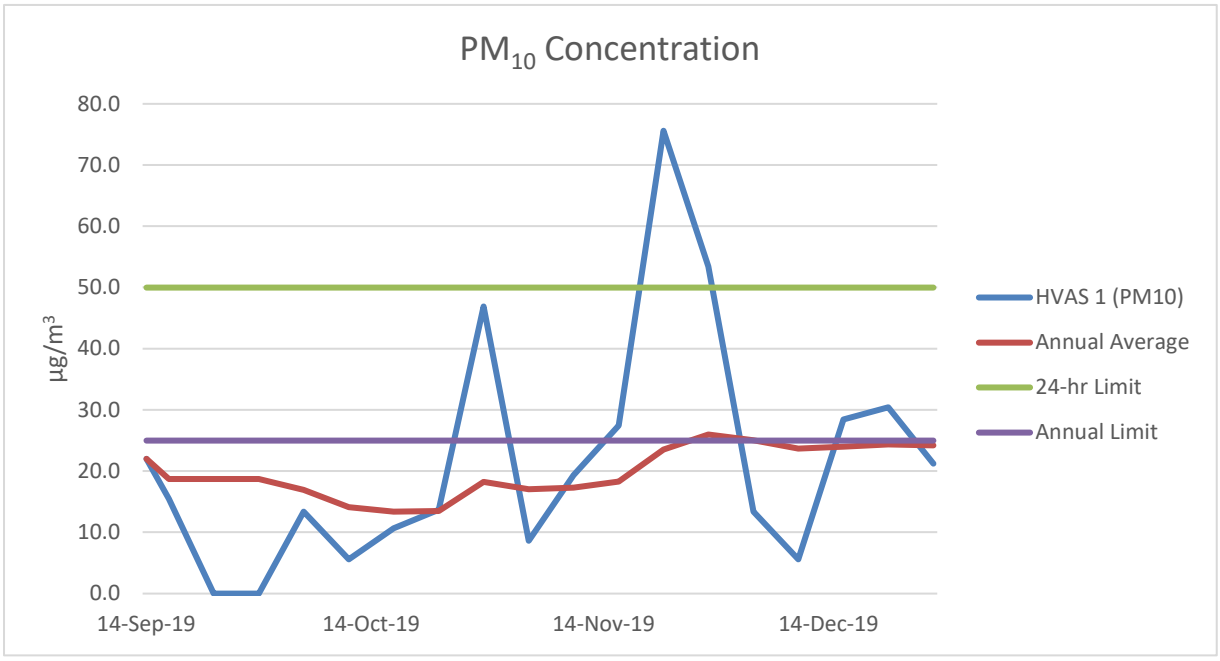

Figure 9: HVAS (PM10) sample results from 14 September to 31 December 2019

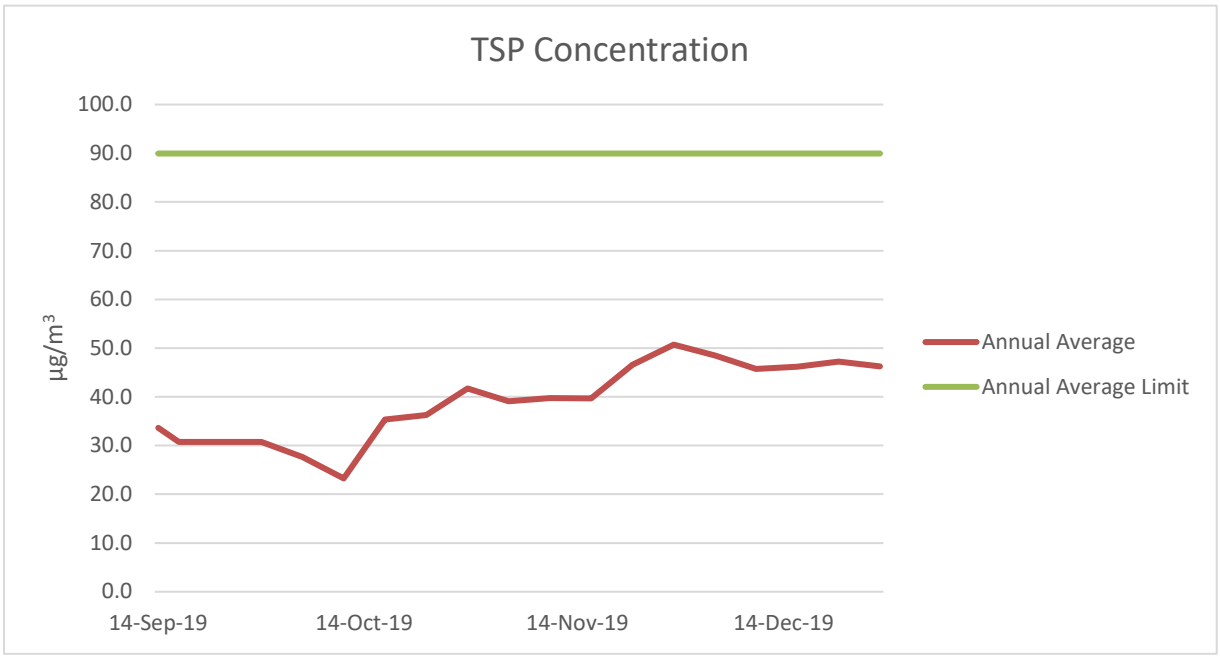

Figure 10: HVAS (TSP) sample results from 14 September to 31 December 2019

The 24-hr average for HVAS 1 (PM_{10}) was 26.2µg/m^3, below the criterion of 50µg/m^3, while the annual average during this sample period was 20.0µg/m^3, below the limit of 25µg/m^3. Likewise, the average during this sample period for HVAS 2 (TSP) was 39.0µg/m^3, below the limit of 90µg/m^3.

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5.1.4.2 BAM Monitoring

Two real-time monitors, which measure PM_{10} on a real-time continuous basis, have been installed as a management tool for quarry operations to guide proactive and reactive mitigation measures.

24-hour average results for the reporting period are provided in **Table 6**. The BAM results are generally consistent with those measured by the HVAS units.

All alarms during the reporting period were the result of either external events, such as bushfires, strong winds and regional dust storms or from system calibration, maintenance or failure.

Table 5: BAM monitoring results from 15 July to 31 December 2019

Monitoring Station	Minimum 24-hr result (µg/m^3)	Maximum 24-hr result (µg/m^3)	24-hr criteria (µg/m^3)	Reporting Period Annual Average (µg/m^3)	Annual criteria (µg/m^3)
RT1	3.23	108.67	50	23.82	25
RT2	4.88	123.13		26.11	

5.1.5 Exceedance Investigations

HVAS 1 (PM_{10}) exceeded the 24-hr concentration criterion listed in Condition 7 of Schedule 3 of the Development Consent on 22 and 28 November. These exceedances have been attributed to the smoke from regional bushfires impacting on air local quality.

There were a number of exceedances identified from both BAM units during the sample period. An investigation into the sources and contributing factors of the exceedances are listed in **Table 7**.

Table 6: BAM Exceedance Investigations

Month	Comments
August	- Construction commenced 26 August - Machine error at RT1 - insects - Machine error at RT2 - air conditioning not working
September	- Regional dust storm event on weekend
October	- BAM service visit and calibration 2/10/19
November	- Regional bushfire smoke impacts on air quality - BAM units cleaned 21/11/19 - Machine error on RT2, average corrected with RT1 data
December	- Regional bushfire smoke impacted on air quality - Machine error on RT2, average corrected with RT1 data, service technician booked

5.1.6 Air Quality Complaints

One complaint was received regarding air quality on 12 September 2019. This complaint was closed out as detailed in **Table 7**.

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6. SCHEDULE 2 CLAUSE 48 – REVIEW OF PFAS EXPOSURE PATHWAYS

WSS engaged suitably qualified and experienced independent expert, approved by the Secretary, to perform as review of PFAS exposure pathways as required by Schedule 2 Clause 48 of the Development Consent.

The report concluded that:

- Base-sourced PFAS is, and has historically been unlikely to be transported to the Site via wind, surface water or groundwater – the Site does not appear to have received PFAS from the Base and does not appear to be acting as a local tertiary PFAS source because:
  - PFAS have not been reported within Site media (shallow and deep soil, surface water and groundwater) which is consistent with the results from the investigation undertaken by the DoD.
- Quarrying has not been performed and has not increased the potential for contaminated groundwater to flow toward the Site's local area. The most probable effect of quarrying will be the formation of a temporary groundwater mound due to increased rainwater infiltration and decreased evapotranspiration, with the local groundwater flow regime unlikely to be influenced for an extended time-period. The influence of quarrying on the groundwater flow regime is expected to decrease the risk of Base derived PFAS.

Please refer to Appendix 9 for the full report.

7. ENVIRONMENTAL PERFORMANCE

7.1 AREA CLEARED

An area of 31, 369 m^2 was cleared during the reporting period, entirely within the Stage 1 initial clearing area as shown on **Figure 11**. Prior to clearing the Boundary was clearly pegged and marked by a registered surveyor.

A further 3, 582 m^2 of clearing occurred associated with construction of the intersection within the area shown in **Figure 11**.

Clearing was performed in compliance with the procedures detailed in the approved Aboriginal Cultural Heritage Management Plan (see Section 7.8.1).

Clearing occurred under the supervision of an ecologist. Habitat trees were clearly marked prior to clearing using flagging or spray paint (see **Plate 3** and **Plate 4**). No fauna injuries were reported (see Section 7.6)

Plate 3 Habitat tree clearly marked with spray paint prior to clearing under supervision by an ecologist.

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Plate 4 Habitat tree clearly marked with flagging tape prior to clearing under supervision by an ecologist.

7.2 REHABILITATION

7.2.1 Areas of Topsoil Application and Depth

Of the area cleared, an area of 3, 460 m^2 has had topsoil re-applied at a minimum depth of 100 mm. **Figure 11** demonstrates the areas were topsoil has been re-applied within the Stage 1 initial clearing area.

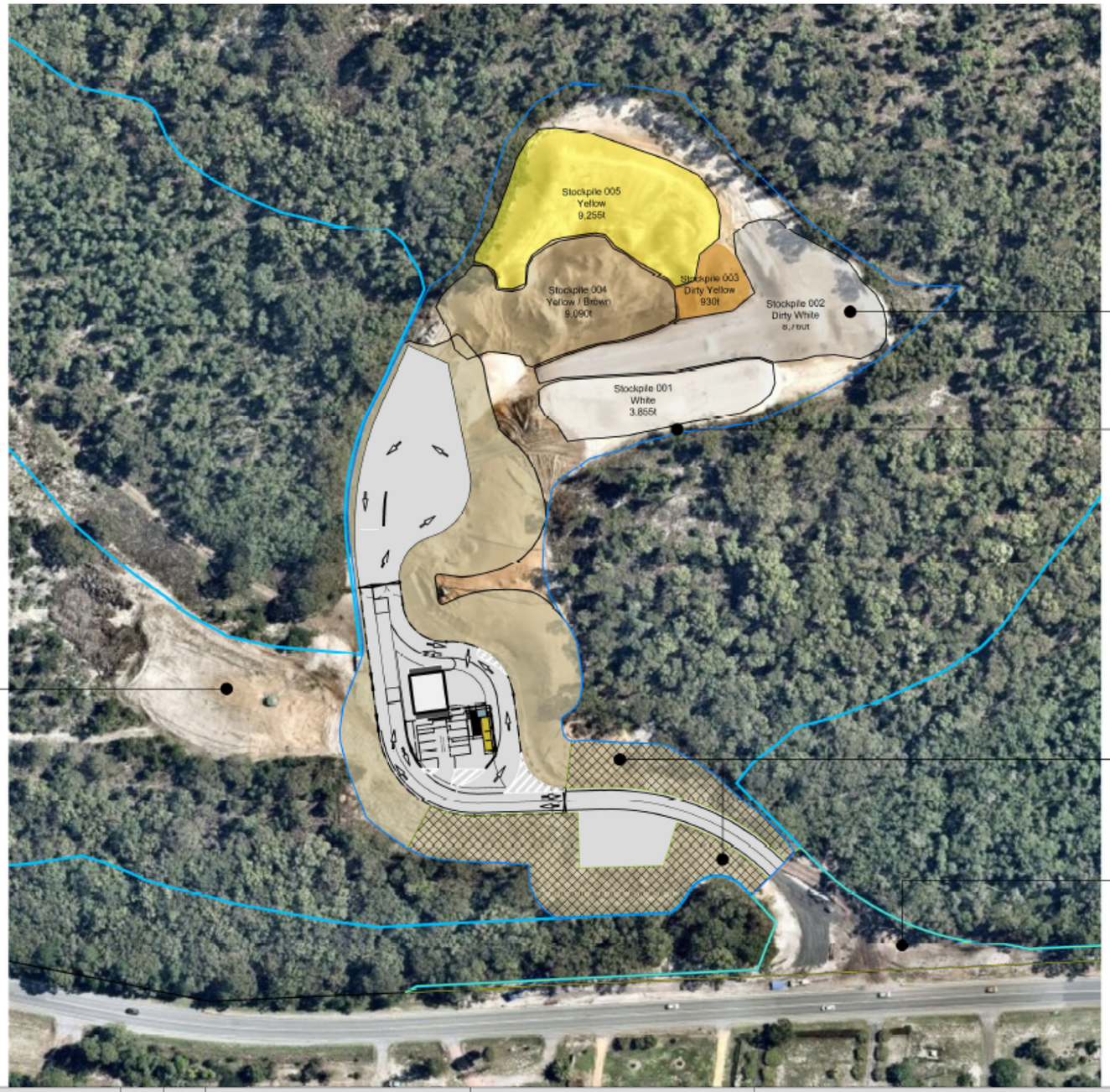

Figure 11 Topsoil Stockpiles and Extent of Clearing during the reporting period

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7.2.2 Weed Control

As the project only commenced in August 2019 and is in the construction phase, weed control has not yet been required in the initial disturbance areas. However, WSS have proactively engaged environmental consultant Kleinfelder to perform a survey of weed species that may be present on site and produce a Weed Identification Booklet to so that weed control can be managed effectively in the future.

7.3 WASTE MANAGEMENT AND MINIMISATION

During construction waste has been minimised by using surplus concrete for counterweight for conveyor bases. This has resulted in no surplus concrete waste.

120 kg of waste steel from construction during the reporting period was been sent for recycling. No further waste steel was produced.

During the reporting period other waste from site consisted of 3 x 3m² general building waste skip bins which were collected by Violia waste services and removed from site to be disposed of appropriately.

Cleared vegetation has been used for batter stabilisation (**Plate 3**) or stockpiled for future use as required. As such no waste has occurred from clearing activities.

During excavation no foreign materials were uncovered.

During the reporting period no permanent effluent system was constructed with temporary ablutions in place only. Waste was removed from these and transported off site by a licenced contractor.

7.4 WATER USE

During the reporting period the volume of water drawn from the HWC network for all activities was 3,087 KL. This was used over a 139 day period since commencement of operations on 14 August and as such equates to an equivalent rate of 8.1 ML per year which is under the estimate of 9.7 ML per year provided in the approved Soil and Water Management Plan.

Since the reporting period an irrigation system has been commissioned on the batters to allow for more efficient use of water in response to managing dust and providing irrigation to facilitate efficient rehabilitation. It has also been noted that the topsoil encountered during construction

is more susceptible to becoming airborne than the larger grained sand beneath. As the Project proceeds into *'Quarrying Operations'* less exposure of non-stabilised topsoil immediately after clearing is anticipated potentially resulting in a reduction in the water required for suppression (notwithstanding other environmental factors).

Water transfer from site was limited to 5, 400 L pumped from temporary ablutions by a licenced contractor.

7.5 PEST MANAGEMENT

No pests were observed during the reporting period and no pest control requirements were identified.

7.6 FAUNA INCIDENTS

No fauna incidents occurred during the reporting period. As a result, no changes to current controls in place regarding fauna interactions have been implemented or are proposed as the results suggest they are adequate. They will continue to be monitored and revised if necessary.

7.7 ENERGY EFFICIENCY

7.7.1 Diesel and Electricity Use

Total fuel usage for the reporting period was 72, 293 litres. Electricity usage only commenced on 1 November 2019 when the electricity connection was completed. Electricity use for the year quarter up to 4 February 2020 was 352.917 kW resulting in approximately 117 kWh being used during the reporting period.

7.7.2 Review of Opportunities to Improve Energy Efficiency

During construction the majority of fuel use is by third party contractors as such there are limited opportunities for review at this stage of the project.

A sprinkler system has been commissioned to reduce the time that fuel carts are required to be running which reduces the fuel burn.

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7.8 HERITAGE MANAGEMENT

7.8.1 Aboriginal Heritage

During construction no item or object of Aboriginal heritage significance was identified on site.

Consultation with the RAP was undertaken to notify of the commencement of the construction activity and appropriately qualified RAP representatives were engaged to inspect the Stage 1 cleared areas prior to topsoil stripping on 23 August 2019 (See Appendix 6 for RAP inspection records).

7.8.2 Historic Heritage

During construction no historic heritage items were identified on site. AHIMS site #38-4-1381 has not been disturbed, and no unknown sites were identified.

7.9 INDEPENDANT ENVIRONMENTAL AUDIT

As per Schedule 5 Clause 12 of the project approval, the first Independent Environmental Audit is required within a year of commencing quarrying operations. Quarrying operations have not yet commenced, with the construction phase commencing on 14 August 2019.

NEWCASTLE SAND

8. COMMUNITY

8.1 COMMUNITY CONSULTATIVE COMMITTEE

One Community Consultative Committee (CCC) meeting was held within the reporting period on 11 October 2019. A copy of the meeting minutes is provided in Appendix 3. Agenda items consisted of discussion around the complaints received which are presented, along with close out actions in **Table 7**.

8.2 NEWSLETTERS

Community information newsletters are produced to provide the community with updates regarding:

- Project progress.
- Operating hours, contact information and details of how to provide feedback.
- Ways in which further information can be sought.
- Summary of project issues affecting community and the response and corrective actions to resolve those issues.

Three newsletters were published with this information during the reporting period in July, August and November 2019. The newsletters are provided in Appendix 4.

8.3 COMPLAINTS RECORDS

Six complaints were received by WSS during the reporting period as detailed in **Table 7**. All complaints were resolved as described by the 'Response and Action' column presented in **Table 7.** Complaints received by WSS are available on the public website. DPIE also received eight complaints during the reporting period as presented in **Table 8**. WSS closed all of these out in consultation with DPIE, as detailed by Appendix 7.

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Table 7 Complaints Received by WSS during the reporting period

Name	Incident ID	Date	Time	Method of Complaint Communication	Key site activities occurring at time of complaint and where? (e.g. clearing and extraction in Sector 2)	Key Complaint Issue (e.g. noise, dust, traffic)	Details	Response and Action	Date of Closure
Keiron Rochester	CTR_INC1	10.9.2019	12:30pm	Phone	Clearing and set up	1. Work starting times. 2. Site egress.	1. Query on the starting time of the earthworks crew. 2. Also people working on site on Sunday. 3. Right turn out of site by staff.	1. Site manager confirmed and days sheets confirm no work commenced prior to 7.00am staff did arrive on site prior to 7.00am. 2. Sunday there was a water cart on site to mange dust control only. 3. Right turn out for trucks is prohibited and is now sign posted, right turn out for passenger vehicles etc is permissible. Darren called back and advised there where no non-compliances	11.09.2019
Steve Kewins	CTR_INC2	12.09.2019	9.15am	Phone	No activities on site over the weekend (except for a water cart for dust control)	Dust	1. Enquiring about dust monitors working, as he noticed dust blowing from the site of an evening over the weekend with high winds.	He was advised the monitors are operating, and we knew we had dust over the weekend that we tried to control. We would be providing notices to residents soon.	12.09.2019
Shirley Davis	CTR_INC3	11.10.2019	12.30pm	Phone	Internal roadworks adjacent to weighbridge area	Traffic	1. Raised concern regarding trucks turning right entering and exiting the site	During civil work vehicles are permitted to enter the site by turning right. Notwithstanding the Quarry Manager contacted the civil works contractor and has directed all contractor heavy vehicles and trucks to enter and exit the site by left turn only. Quarry Manager returned call to complainant and left voice message of actions taken.	11.10.2019

Kay Rochester	CTR_INC4	11.10.2019	1.01pm	Phone	Internal roadworks adjacent to weighbridge area	Traffic	1. Raised concern regarding trucks turning right entering and exiting the site 2. Concerned about traffic passing on the inside of turning trucks with potential for accident.	During civil works, vehicles are permitted to enter the site by turning right. Newcastle Sand has no control over the driving practises of the general public in regards to overtaking. Notwithstanding the Quarry Manager contacted the civil works contractor and has directed all contractor heavy vehicles and trucks to enter and exit the site by left turn only. Quarry Manager returned call to complainant and left voice message of actions taken	11.10.2019
Barry Davis	CTR_INC5	24.10.2019	11.46am	Phone	After Hours	Noise	1. Raised concern regarding a person cutting logs onsite at 8-8.30 pm on 23.10.2019.	Quarry manager investigated and found that another neighbour had cut logs on site for firewood in front of entry gate between 6.00 and 7.00pm. Neighbour has been informed that he is not authorised to cut timber inside property adjacent to roadway. Called complainant back to advise of findings and discussed with son and wife Shirley.	24.10.2019
Kay Rochester	CTR_INC6	24.10.2019	2.50pm	Phone	Internal roadworks	Traffic	1. Kay raised concern that a truck passed her car on the inside to turn left into the mine site, whilst she was stationary awaiting to turn into her driveway. A car travelling behind the truck apparently nearly hit Kay 's car.	Quarry manager immediately contacted the civil construction foreman who questioned the truck driver to get more details. "Truck driver had indicated to turn left and slowed down to enter site and a member of the public has sped past him. Truck driver had sufficient room to safely pass on the inside and the car following was at fault."	24.10.2019

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Table 8 Complaints Received by DPIE the reporting period

NEWCASTLE SAND - COMPLAINTS RESPONSE FORM						
Complaint Received	**Response**	**Works descriptions for that date**	**Attachments**		**Comments**	**Corrective Action**
Tuesday 27th August - 5.40 am arrival	Staff arrived onsite at 8.30am as supported by attached documentation. It is also noted, staff are allowed to arrive onsite prior to 7am as long as no noise is made that can be heard by nearby residences, however operations can not commence until after 7am.	Works included clearing of native vegetation. Onsite works were within approved operations hours as outlined in the CEMP	Work Logs Sign in / Out sheets Truck Logs Inspection Logs Toolbox talk sheet other	Yes Yes n/a n/a n/a n/a	Complete Vegetation Control, daily job sheet is attached, clearly outlining staff onsite, operating hours and tasks completed on that day	none required
Saturday 7th September - 3.30pm departure	As the site was under construction, and automated dust suppression systems had not been put in place yet, watercart hire was required on days that had the potential to create dust issues. Hence Newcastle Sand had dust suppression activities occurring on this day to reduce risk of nearby residence being affected.	watercart spraying site for dust suppression purposes	Work Logs Sign in / Out sheets Truck Logs Inspection Logs Toolbox talk sheet other	Yes Yes n/a Yes n/a n/a	A1 Haulage and Water Cartage plant hire docket is attached, clearly outline tasks for the day, arrival and departure time. The choice to undertake dust suppression activities on the weekends, on high risk days, was to ensure Newcastle Sand, remained a good neighbour and environmental steward. These activities would eb classed as maintenance activities and therefore permissible.	none required
Sunday 8th September- 9.30am arrival and 12 pm departure	As the site was under construction, and automated dust suppression systems had not been put in place yet, watercart hire was required on days that had the potential to create dust issues. Hence Newcastle Sand had dust suppression activities occurring on this day to reduce risk of nearby residence being affected.	watercart spraying site for dust suppression purposes	Work Logs Sign in / Out sheets Truck Logs Inspection Logs Toolbox talk sheet other	Yes Yes n/a Yes n/a n/a	A1 Haulage and Water Cartage plant hire docket is attached, clearly outline tasks for the day, arrival and departure time. The choice to undertake dust suppression activities on the weekends, on high risk days, was to ensure Newcastle Sand, remained a good neighbour and environmental steward. These activities would eb classed as maintenance activities and therefore permissible.	none required
Friday 27th September - 5.40 arrival	Subcontractor arrived at site prior to 7am and floated 13 ton excavator. This was a breach of conditions	Machinery picked up and floated offsite	Work Logs Sign in / Out sheets Truck Logs Inspection Logs Toolbox talk sheet other	Yes Yes an/ n/a Yes n/a	The subcontractor was spoken to, regarding approved operation hours and all staff were spoken too via a toolbox talk, to reinforce the approved operation hours of the site.	Staff spoken too on the daily of the incident
Sunday 20th October - working all day departure 5pm	As the site was under construction, and automated dust suppression systems had not been put in place yet, watercart hire was required on days that had the potential to create dust issues. Hence Newcastle Sand had dust suppression activities occurring on this day to reduce risk of nearby residence being affected.	watercart spraying site for dust suppression purposes	Work Logs Sign in / Out sheets Truck Logs Inspection Logs Toolbox talk sheet other	Yes Yes n/a Yes n/a n/a	P & O Cunningham Pty Ltd. hire docket is attached, clearly outline tasks for the day, arrival and departure time. The choice to undertake dust suppression activities on the weekends, on high risk days, was to ensure Newcastle Sand, remained a good neighbour and environmental steward. These activities would be classed as maintenance activities and therefore permissible.	none required
			Work Logs	Yes		none required

Saturday 26th October - 6.15am arrival and 5.30pm departure	As the site was under construction, and automated dust suppression systems had not been put in place yet, watercart hire was required on days that had the potential to create dust issues. Hence Newcastle Sand had dust suppression activities occurring on this day to reduce risk of nearby residence being affected.	watercart spraying site for dust suppression purposes	Sign in / Out sheets	Yes	P & O Cunningham Pty Ltd. hire docket is attached, clearly outline tasks for the day, arrival and departure time. The choice to undertake dust suppression activities on the weekends, on high risk days, was to ensure Newcastle Sand, remained a good neighbour and environmental steward. These activities would be classed as maintenance activities and therefore permissible.		
			Truck Logs	n/a			
			Inspection Logs	Yes			
			Toolbox talk sheet	n/a			
			other	n/a			
Sunday 10th November - working all morning	No works were carried out by sub-contractors on this day.	no works	Work Logs	n/a	none	none required	
			Sign in / Out sheets	n/a			
			Truck Logs	n/a			
			Inspection Logs	n/a			
			Toolbox talk sheet	n/a			
			other	n/a			
Sunday 17th October - working all morning	As the site was under construction, and automated dust suppression systems had not been put in place yet, watercart hire was required on days that had the potential to create dust issues. Hence Newcastle Sand had dust suppression activities occurring on this day to reduce risk of nearby residence being affected.	watercart spraying site for dust suppression purposes	Work Logs	Yes	P & O Cunningham Pty Ltd. hire docket is attached, clearly outline tasks for the day, arrival and departure time. The choice to undertake dust suppression activities on the weekends, on high risk days, was to ensure Newcastle Sand, remained a good neighbour and environmental steward. These activities would be classed as maintenance activities and therefore permissible.		
			Sign in / Out sheets	Yes			
			Truck Logs	n/a			
			Inspection Logs	Yes			
			Toolbox talk sheet	n/a			
			other	n/a			

Notable Conditions of Consent	
Approved construction hours - 7am to 5pm Monday - Friday and 8am to 1pm Saturday (CEMP)	
Maintenance can be undertaken at anytime, as long as it is not audible	

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9. NON-COMPLIANCES

The rehabilitation bond was required to be lodged by 14 October 2019 to be in compliance with Schedule 3 Clause 38 of the Development Consent. Administrative error saw a delay in this process with DPIE requesting it be submitted by 31 January 2020. The bond was subsequently lodged on 31 January 2020.

No further non-compliances occurred during the 2019 reporting period.

NEWCASTLE SAND

10. DEVELOPMENT IMPACT PREDICTION DISCREPANCIES

As Quarrying Operations have not yet commenced and the Project was in the construction phase throughout the reporting period, there have been no development impact discrepancies identified to date, other than the timeframe of construction extending beyond the predicted 12-week construction period.

Construction duration variance from the CEMP has been caused by:

- Road Works
  - Utility relocation construction period being much longer than expected by both water and Telstra
  - The sheet piling installation being required for the construction methodology of the retaining wall to retain the batter
  - • Delays with material procurement road pavement material availability
- Internal Works
  - Additional time required to move internal bulk earthworks (retaining sand for future sale), opposed to exporting off site.

WSS are committed to completing construction as efficiently as possible while maintaining a safe and compliant operation. Construction is anticipated to be completed in April 2020.

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11. IMPROVEMENT

Throughout the remainder of the construction phase and once Quarrying Operations commence, WSS will implement the necessary actions to meet the performance objectives described by the EMP and conditions of consent and review implementation performance to identify opportunities for improvement.

11.1 REVISION OF STRATEGIES, PLANS & PROGRAMS

As per Schedule 5 Clause 4 of the Project approval, within 3 months of the submission of this AEMR WSS will review the strategies, plans and programs under the Development Consent and notify DPIE in writing of any such review being undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document will be submitted for approval by DPIE.

NEWCASTLE SAND

APPENDIX 1. PROJECT APPROVAL

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Development Consent

Section 4.38 of the *Environmental Planning and Assessment Act 1979*

The Independent Planning Commission, as the declared consent authority under clause 8A of the *State Environmental Planning Policy* (State and Regional Development) 2011 and section 4.5(a) of *the Environmental Planning and Assessment Act 1979*, approves the development application referred to in Schedule 1, subject to the conditions in Schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.

Dianne Leeson (Chair)
Member of the Commission

Peter Cochrane
Member of the Commission

Peter Duncan AM
Member of the Commission

Sydney 9 May 2018

SCHEDULE 1

Application Number	SSD-6125
Applicant	Williamtown Sand Syndicate
Consent Authority:	The Independent Planning Commission NSW
Site:	Lot 1012 DP 814078 Lot 11 DP 629503 Lot 121 DP 556403 Lot 1 DP 224587
Development	Cabbage Tree Road Sand Quarry

APPENDIX 2. EPL

Environment Protection Licence

Licence - 21264

Licence Details	
Number:	21264
Anniversary Date:	31-July

Licensee

WILLIAMTOWN SAND SYNDICATE PTY LIMITED

PO BOX 186

WARATAH NSW 2298

Premises

CABBAGE TREE ROAD SAND QUARRY

298 CABBAGE TREE ROAD

WILLIAMTOWN NSW 2318

Scheduled Activity

Crushing, grinding or separating

Extractive activities

Fee Based Activity	Scale
Crushing, grinding or separating	> 100000-500000 T annual processing capacity
Extractive activities	> 100000-500000 T annual capacity to extract or process

Region

North - Hunter

Ground Floor, NSW Govt Offices, 117 Bull Street
NEWCASTLE WEST NSW 2302

Phone: (02) 4908 6800

Fax: (02) 4908 6810

PO Box 488G

NEWCASTLE NSW 2300

Environment Protection Licence

Licence - 21264

INFORMATION ABOUT THIS LICENCE ---- 4

Dictionary ---- 4

Responsibilities of licensee ---- 4

Variation of licence conditions ---- 4

Duration of licence ---- 4

Licence review ---- 4

Fees and annual return to be sent to the EPA ---- 4

Transfer of licence ---- 5

Public register and access to monitoring data ---- 5

1 ADMINISTRATIVE CONDITIONS ---- 6

A1 What the licence authorises and regulates ---- 6

A2 Premises or plant to which this licence applies ---- 6

A3 Information supplied to the EPA ---- 6

2 DISCHARGES TO AIR AND WATER AND APPLICATIONS TO LAND ---- 7

P1 Location of monitoring/discharge points and areas ---- 7

3 LIMIT CONDITIONS ---- 9

L1 Pollution of waters ---- 9

L2 Waste ---- 9

L3 Noise limits ---- 9

L4 Hours of operation ---- 11

L5 Potentially offensive odour ---- 11

L6 Other limit conditions ---- 11

4 OPERATING CONDITIONS ---- 11

O1 Activities must be carried out in a competent manner ---- 11

O2 Maintenance of plant and equipment ---- 12

O3 Dust ---- 12

O4 Emergency response ---- 13

O5 Processes and management ---- 13

O6 Other operating conditions ---- 14

5 MONITORING AND RECORDING CONDITIONS ---- 15

M1 Monitoring records ---- 15

M2 Requirement to monitor concentration of pollutants discharged ---- 16

M3 Testing methods - concentration limits ---- 17

M4 Weather monitoring ---- 17

Environment Protection Licence

Licence - 21264

M5 Recording of pollution complaints ---------- 18
M6 Telephone complaints line ---------- 18
M7 Other monitoring and recording conditions ---------- 18
M8 Noise monitoring ---------- 18
6 REPORTING CONDITIONS ---------- 19
R1 Annual return documents ---------- 19
R2 Notification of environmental harm ---------- 20
R3 Written report ---------- 20
R4 Other reporting conditions ---------- 21
7 GENERAL CONDITIONS ---------- 21
G1 Copy of licence kept at the premises or plant ---------- 21
DICTIONARY ---------- 23
General Dictionary ---------- 23

Environment Protection Licence

Licence - 21264

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 21264

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

WILLIAMTOWN SAND SYNDICATE PTY LIMITED
PO BOX 186
WARATAH NSW 2298

subject to the conditions which follow.

Environment Protection Licence

Licence - 21264

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Crushing, grinding or separating	Crushing, grinding or separating	> 100000 - 500000 T annual processing capacity
Extractive activities	Extractive activities	> 100000 - 500000 T annual capacity to extract or process

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
CABBAGE TREE ROAD SAND QUARRY
298 CABBAGE TREE ROAD
WILLIAMTOWN
NSW 2318
AS SHOWN ON PLAN TITLED "QUARRY OPERATIONS PLAN - FIGURE 1" **WITHIN ALLOTMENTS:** **LOT 1012 DP 814078** **LOT 11 DP 629503** **LOT 121 DP 556403** **LOT 1 DP 224587** **THIS PLAN HAS BEEN FILED AS EPA DOCUMENT DOC19/442133.**

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence

replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
13	Ambient Air Monitoring		PM10 real time particulate monitoring station as described as "RT1" in the document titled "Particulate Matter Monitoring Locations , Figure 5," dated 22 July 2019, EPA file Doc19/629648.
14	Ambient Air Monitoring		PM10 real time particulate monitoring station as described as "RT2" in the document titled " Particulate Matter Monitoring Locations, Figure 5," dated 22 July 2019, EPA file Doc19/629648.
15	Ambient Air Monitoring		PM10 particulate monitoring station as described as "HVAS-1 PM10" in the document titled "Particulate Matter Monitoring Locations, Figure 5," dated 22 July 2019, EPA file DOC19/629648.
16	Ambient Air Monitoring		TSP particulate monitoring station as described as "HVAS-2 TSP" in the document titled "Particulate Matter Monitoring Locations, Figure 5," dated 22 July 2019, EPA file DOC19/629648.

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description

1	Groundwater Monitoring	Groundwater Monitoring Bore "BH2" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry" - EPL Supporting Documentation dated 19 March 2019, EPA Doc19/382742.
2	Groundwater Monitoring	Groundwater Monitoring Bore "BH4" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation" dated 19 March 2019, EPA Doc19/382742.
3	Groundwater Monitoring	Groundwater Monitoring Bore "BH6" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation" dated 19 March 2019, EPA Doc19/382742.
4	Groundwater Monitoring	Groundwater Monitoring Bore "BH7" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation: dated 19 March 2019, EPA Doc19/382742.
5	Groundwater Monitoring	Groundwater Monitoring Bore "BH9" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation" dated 19 March 2019, EPA Doc19/382742.
6	Groundwater Monitoring	Groundwater Monitoring Bore "BH11" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation" dated 19 March 2019, EPA Doc19/382742.
7	Groundwater Monitoring	Groundwater Monitoring Bore "MW239S"" as shown in Figure 7, in document titled "Cabbage Tree Road Sand Quarry - EPL Supporting Documentation" dated 19 March 2019, EPA Doc19/382742.

P1.4 The following points referred to in the table below are identified in this licence for the purposes of weather and/or noise monitoring and/or setting limits for the emission of noise from the premises.

Noise/Weather

EPA identification no.	Type of monitoring point	Location description
17	Meteorological Station	Williamtown Bureau of Meteorology Station

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.

L3 Noise limits

L3.1 Noise Limits

Receiver	Day LAeq(15 Min)	Shoulder LAeq(15 Min)	Shoulder LA Max(1 Min)
Any residential reciever	43	39	45

L3.2 Operational noise generated at the premises must not exceed the noise limits shown in the table above.

Note: The noise limits detailed above do not apply at a particular residence if the licensee has a written agreement with that particular residence to exceed those limits.

Note: This condition does not apply to construction activities of the intersection of the quarry access road and Cabbage Tree Road or vegetation clearing in the Southern Resource Area.

L3.3 The following noise limits apply to vegetation clearing in the Southern Resource Area.

The licensee must only undertake vegetation clearing activities in the Southern Resource Area in the following circumstances:

a)noise generated by the development does not exceed 47dB(A)LAeq (15min);

b)bulldozer(s) or equipment with sound power levels greater than 104 dB(A) are not permitted to be used

in sectors 9B, 10A, 10B, and 10C as shown in Figure 2 of Appendix 1 of Project Approval SSD-6125;

c)clearing operations are limited to:

- the day period, Monday to Friday only;
- campaigns not exceeding 5 consecutive working days; and
- no more that 4 campaigns in a calendar year.

L3.4 For the purpose of the Noise limits above:

Day is the period from 7am to 6pm Monday to Friday and 7am to 4pm Saturdays.
The morning shoulder period is from 6am to 7am Monday to Friday.

L3.5 The noise limits set out in this licence apply under all meteorological conditions except for the following:

a) Wind Speeds greater than 3 metres/second at 10 metres above ground level; or
b) Stability category F temperature inversion conditions and wind speeds greater than 2 metres/second at 10 metres above ground level; or
c) Stability class G temperature inversions.

L3.6 For the purpose of the condition above:
a) Data recorded by the meteorological station identified as EPA monitoring point 17 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the sigma theta method referred to in the NSW Noise Policy for Industry.

L3.7 **Determining Compliance**

To determine compliance:
a) with the Leq (15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.
b) with the LA1(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.
c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) at the most affected point at a location where there is no dwelling at the location; or
ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.

Note: A non-compliance of the Noise Limits table will still occur where noise generated from the premises in excess of the appropriate limit is measured:
i) at a location other than an area prescribed in part (a) and part (b); and/or
ii) at a point other than the most affected point at a location.

L3.8 For the purposes of determining the noise generated at the premises the modification factors in Fact Sheet C of the NSW Noise Policy for Industry must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

L4 Hours of operation

L4.1 Quarrying operations

7am to 5pm Monday to Friday
7am to 4pm Saturday
At no time on Sundays or public holidays.

Loading and dispatch of laden trucks

6am to 6pm Monday to Friday
7am to 4pm Saturday
At no time on Sundays or Public holidays.

Note: The licensee may undertake maintenance activities outside these hours provided it is not audible at any residential receiver.

L5 Potentially offensive odour

L5.1 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

L6 Other limit conditions

Extraction and Rehabilitation Depth Limits

L6.1 The Licensee must not undertake any sand extraction within 0.7 metres of the predicted maximum groundwater level at the premises at any time.

L6.2 The Licensee must ensure that rehabilitation final landform levels remain 1 metre above the maximum predicted groundwater height.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the

activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All areas in or on the premises must be maintained in a condition that prevents or minimises the emission of dust to the air.

O3.2 Any activity carried out in or on the premises must be carries out by such practical means as to prevent dust or minimise the emission of dust to the air.

O3.3 Any plant operated in or on the premises must be operated by such practical means to prevent or minimise dust or other air pollutants.

O3.4 All trafficable areas and vehicle manoeuvring areas in or on the premises must be maintained, at all times, in a condition that will minimise the emission of dust to the air, or emission from the premises of wind-blown or traffic generated dust.

O3.5 Trucks entering and leaving the premises that are carrying loads of dust generating materials must have their loads covered at all times, except during loading and unloading.

O3.6 The licensee must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of operations to match its available water supply for dust suppression purposes.

O3.7 The licensee must review operations and ensure that water dust suppression is active on haul roads and stockpile areas during the following conditions:

a) Where wind conditions are directed towards surrounding residences, that is, the weather station indicates winds are blowing from the quadrants west (270 degrees) through North (0 degrees) to East (90 degrees).

b) When the continuous PM10 monitor shows the rolling PM10 24 hr average exceeds the background average concentration of 22 micrograms per cubic metre.

O3.8 The Licensee must cease all topsoil stripping and dozer operations when the following occurs:

a) Wind is directed towards surrounding residences, and
b) Rolling PM10 24 hr average exceeds 35 micrograms per cubic metre.

O3.9 The Licensee must suspend all sand processing activities when:

a) Wind is directed towards surrounding residences, and
b) Rolling PM10 24 hr average exceeds 40 micrograms per cubic metre.

O3.10 The Licensee must suspend all sand extraction from the face when dust levels increase after two hours when:

a) Wind is directed towards surrounding residences, and
b) Rolling PM10 24 hr average exceeds 42.2 micrograms per cubic metre.

O3.11 If dust levels continue to increase after two hours, the Licensee must cease loading and shut down all machinery at the premises when:

a) Wind is directed towards surrounding residences, and
b) Rolling PM10 24 hr average exceeds 45 micrograms per cubic metre.

O3.12 The Licensee must progressively rehabilitate mined/quarried areas as each section is completed.

O4 Emergency response

Note: The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The licensee must keep the incident response plan on the premises at all times. The incident response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment.

The PIRMP must be tested at least annually or following a pollution incident.

The licensee must develop the Pollution Incident Response Management Plan in accordance with the requirements in Part 5.7A of the Protection of the Environment Operations (POEO) Act 1997 and POEO regulations.

O5 Processes and management

Preventing Pollution from Fuels and Chemicals

O5.1 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.

O5.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank where a group of tanks are installed);
c) have floors graded to a collection sump; and
d) not have a drain valve incorporated in the bund structure,

or be constructed and operated in a manner that achieves the same environmental outcome.

O5.3 All fuel storage and refuelling areas at the premises must be constructed to comply with the relevant Australian Standards.

O5.4 Except as detailed in the condition below, refuelling and all storage of fuels and chemicals must be within an appropriately roofed and concrete bunded area within the workshop compound, located outside of the Tomago Sandbeds Special Area.

O5.5 Tracked plant may be refuelled on a fully bunded and lined hardstand located within the Tomago Sandbeds Special Area. This bunded and lined area must be capable of holding both the tracked equipment and the fuel tank.

O5.6 No fuel storage or refuelling activities may occur at the premises outside of the areas constructed to the relevant Australian Standards.

O5.7 The Licensee must ensure that, outside of the operating hours during which quarrying operations are permitted, all fuel powered equipment is removed from the "Tomago Sandbeds Special Area" to a secure storage, except for equipment being used in vegetation clearing operations, which may be stored within a fully bunded and lined hardstand area outside of operating hours.

Preventing Pollution from Trucks

O5.8 The Licensee must;
a)ensure that all laden trucks entering or exiting the site have their loads covered;
b)ensure that all laden trucks exiting the site are cleaned before leaving the site of material that may fall from vehicles; and
c) use its best endeavours to ensure that appropriate signage is displayed on all trucks used to transport product from the development so that they can be easily identified by road users.

Waste Classification

O5.9 The licensee must ensure that any liquid and/or non liquid waste generated and/or stored at the premises is assessed and classified in accordance with the DECC Waste Classification Guidelines as in force from time to time.

O6 Other operating conditions

Minimising Noise

O6.1 All dozers operating within the Southern Resource Area must be restricted to operating in first gear in reverse to minimise associated track noise.

O6.2 All mobile equipment used onsite must be fitted with a BBS-Tec "back alarm" broadband reversing alarm or similar such device.

Managing Contamination from Past Activities

O6.3 No groundwater on the premises is to be extracted or used on the premises without the prior approval of the EPA.

O6.4 Within the premises boundary the Licensee must accurately determine the location of areas impacted by the former mineral sand extraction operations including the settling ponds, sand tailings disposal areas, monazite trenches and the "equipment graveyard" areas and prior to works commencing on site install suitable fencing to prohibit any activities in these areas.

Stormwater Management

O6.5 The drainage from all areas at the premises which will liberate suspended solids when stormwater runs over these areas must be diverted to adequately sizes sediment basins.

O6.6 The sediment basins must be maintained to ensure that their design capacity is available for the storage of all runoff from cleared areas.

O6.7 Stormwater management measures must be prepared and implemented to mitigate the impacts of stormwater run-off from and within the premises in a manner that is consistent with the Stormwater Management Plan for the catchment. Where a Stormwater Management Plan has not yet been prepared the measures should be consistent with the guidance contained in Managing Urban Stormwater: Soils and Construction: Volume 2C Unsealed Roads and Volume 2E Mines and Quarries (DECCW 2008).

Sewage Management

O6.8 The Licensee must establish and use an on-site sewage pump out system, incorporating an adequately sized holding tank located outside of the "Tomago Sandbeds Special Area".

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

Environment Protection Licence

Licence - 21264

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 13,14

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Continuous	Australian Standard 3580.9.8 - 2001

POINT 15

Pollutant	Units of measure	Frequency	Sampling Method
PM10	micrograms per cubic metre	Every 6 days	AM-18

POINT 16

Pollutant	Units of measure	Frequency	Sampling Method
Total suspended particles	micrograms per cubic metre	Every 6 days	AM-15

M2.3 Water and/ or Land Monitoring Requirements

POINT 1,2,3,4,5,6,7

Pollutant	Units of measure	Frequency	Sampling Method
Arsenic	micrograms per litre	Monthly	Grab sample
Conductivity	microsiemens per centimetre	Monthly	Grab sample
Depth	metres	Monthly	Probe
Iron	milligrams per litre	Monthly	Grab sample
Manganese	milligrams per litre	Monthly	Grab sample
pH	pH	Monthly	Grab sample
Turbidity	nephelometric turbidity units	Monthly	Grab sample

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Weather monitoring

M4.1 At the point(s) identified below, the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1 of the table below, using the corresponding sampling method, units of measure, averaging period and sampling frequency, specified opposite in the Columns 2, 3, 4 and 5 respectively.

POINT 17

Parameter	Sampling method	Units of measure	Averaging period	Frequency
Temperature at 2 metres	AM-4	degrees Celsius	1 hour	Continuous
Wind Direction at 10 metres	AM-2 & AM-4	Degrees	15 minutes	Continuous
Wind Speed at 10 metres	AM-2 & AM-4	metres per second	15 minutes	Continuous
Sigma Theta	AM-2 & AM-4	Degrees	15 minutes	Continuous
Rainfall	AM-4	millimetres	15 minutes	Continuous
Relative humidity	AM-4	percent	1 hour	Continuous

Environment Protection Licence

M5 Recording of pollution complaints

M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M5.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M6.3 The preceding two conditions do not apply until 60 days after the date of the issue of this licence.

M7 Other monitoring and recording conditions

Extraction Height Survey

M7.1 The licensee must ensure quarry operators are aware excavation RL heights to allow continual compliance with extraction depth limits. Such provisions may include GPS capability on quarry machinery, relevant network of survey pegs and frequent surveys of operations.

M8 Noise monitoring

M8.1 To assess compliance with the noise limits section of this licence, attended noise monitoring must be undertaken in accordance with the noise conditions and:

a) at a location representative of the most affected residences in the noise limit conditions and;

b) occur quarterly in a reporting period;

c) occur each day and shoulder period as defined in the NSW Industrial Noise Policy for a minimum of:

- 1.5 hours during the day; and
- 30 minutes during the shoulder period.

d) occur for three consecutive operating days.
Note: It is the intention of the EPA to review the noise monitoring results required under this condition after a period of (3) years to assess the suitability of the required monitoring.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is

given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Groundwater Monitoring Report

R1.8 The licensee must supply with each Annual Return a monitoring report that includes:

a) all groundwater monitoring results obtained over the reporting period;
b) a graphical presentation of all groundwater monitoring results (one parameter per graph) extending back to when monitoring began; and
c) a commentary on results that have been obtained, highlighting any changes or trends observed over time and make recommendations where adverse effects are identified.

Annual Extraction Height Survey

R1.9 The licensee must submit to the EPA with each Annual Return an annual independent survey report to demonstrate compliance with the extraction depth limit on this licence. The report must show all RL's of quarry operations and compare these against the RL's for the maximum predicted groundwater levels.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the

carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

Noise Monitoring Report

R4.1 A noise compliance assessment report must be submitted to the EPA within 30 days of the completion of the quarterly monitoring. The assessment must be prepared by a suitably qualified and experienced acoustical consultant and include:

a) an assessment of compliance with the noise limits as detailed in this licence; and

b) an outline of any management actions taken within the monitoring period to address any exceedances of the limits detailed in this licence.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

Environment Protection Licence

Licence - 21264

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G1.4 The Licensee must nominate to the EPA a representative of the proponent that is available at all times and is capable of providing immediate assistance or response during emergencies or any other incidents at the premises. The name of the nominated representative and their contact details, including their telephone number, must be current at all times. The nomination and contact details must be provided to the EPA's Director - Hunter at PO BOX 488G, Newcastle NSW 2300.

Environment Protection Licence

Licence - 21264

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 21264

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Peter Jamieson

Environment Protection Authority

(By Delegation)

Date of this edition: 31-July-2019

End Notes

APPENDIX 3. COMMUNITY CONSULTATIVE COMMITTEE MINUTES

Williamtown Sand Syndicate (WSS)
Cabbage Tree Road Sand Quarry
Community Consultative Committee Meeting

11 October 2019
9:00-11:00
Mercure Hotel, Williamtown

Meeting Number:	1st Meeting	**Type of meeting:**	General
Chairperson:	John Turner	**Note taker:**	Jonathan Berry

Attendees:
Wayne Sampson (Resident) – WS
Janet Meyn (Port Stephens Council) – JM
Jonathan Berry (Kleinfelder) – JB
Barry Davis (Resident) – BD
Shirley Davis (Resident) – SD
Darren Williams (WSS) – DW
Paul Bourne (WSS / Newcastle Sand) – PB

Apologies:
Kieron Rochester
John Simpson (Hunter Water Representative)

Observers: Kay Rochester (Resident) - KR

Meeting Open: 9:00am

Minutes

Agenda item: 1 **Apologies** **Presenter:** John Turner

Discussion:

Kieron Rochester.

Agenda item: 2 **Declaration of Pecuniary Interest** **Presenter:** NA

Discussion:

John Turner (Chairperson) – Paid for service by WSS.
Wayne Sampson (Resident) – Deed with WSS.
Janet Meyer (Port Stephens Council) – Owner of land, receives royalty for sand.
Jonathan Berry (Kleinfelder) – Consultant employed by WSS.
Barry Davis (Resident) – Nil.
Shirley Davis (Resident) – Nil.
Kay Rochester (Resident) – Nil.
Darren Williams (WSS) – Quarry owner.
Paul Bourne (WSS / Newcastle Sand) – Quarry employee.

Agenda item: 3	**Correspondence**	**Presenter:**	John Turner

Discussion:

Nil.

Agenda item: 4	**Proponents Reports and Overview** * progress of the project * monitoring and environmental performance * community complaints and response to these complaints * information provided to the community and any feedback	**Presenter:**	Jonathan Berry

Discussion:

JB provided run through of Powerpoint presentation projected on television screen (attached), questions and comments raised periodically.

- KR. PFOS measured at bore at front of yard.
- BD. Westerly winds would be expected to be a problem for dust given experience on another sand site.
- JB. Several enquiries made, website to be updated with latest spreadsheet.
- JB. Newsletter to be delivered pre-intersection construction.
- WS. How are we going to manage trucks turning up early?
- JB. DW. Inductions, Code of Conduct compliance, gate inset from road and/or combination lock to ensure trucks are not stuck at the gate and can stop inside site away from houses.
- KR. BD. Has been an issue with an early start where third-party collected an excavator from the road reserve prior to 6am. BD. Spoke with the float operator at time of collection about the noise at that time of morning.
- KR. SD. Concern about trucks turning into site from right lanes, White Towers truck seen doing turn regularly.
- JB. Better education of drivers may be required.
- SD. What has been onsite in the last few days? Any rollers?
- DW. Yes roller has been onsite as of Thursday 10/10/19.
- SD. Has noticed vibrating cabinet due to something.
- DW. SD to contact PB next time it happens and he will come and inspect.
- BD. Can put rubber under cabinet should not be a problem.
- WS. Will the 60km/h speed limit for the intersection and over Christmas period be 24 hours?
- DW. Yes, given the jersey kerb is on the shoulder it would be expected to remain in place 24 hours per day.
- DW. Unclear when the Christmas shutdown period would be, RMS typically mandates from just before Christmas to after the new year in early January.
- Presentation included discussion on noise level observations, comment made to check these at different locations as the bitumen surface heavily influences noise levels from passing vehicles.
- DW. Expect internal works to be completed by Christmas and road works to be underway, with completion in late January, early February 2020.
- SD noted reversing beepers had been causing her concern.
- PB/ DW / JB. Noted a couple of third party pieces of plant did have beepers, most of these have been removed from site. Trying to ensure new plant only has broadband reversing alarms. All operational plant will have a broadband reversing alarm.

Conclusions:

Key actions from the above discussions summarized below:

	Action items	**Person responsible**	**Deadline**
✓	Update complaints spreadsheet on website.	DW	18 October 2019
✓	Newsletter to be delivered prior to construction of intersection. Newsletter to include note on no unauthorized access.	PB	TBA

Action items	Person responsible	Deadline
✓ Followup with contractors with discussion on how to best access the site and educate on best practice in line with the Traffic Control Plan in place.	PB	18/10/2019
✓ SD to contact PB next time vibration occurs to inspect the rattling cabinet.	SD / PB	As needed
✓ Check noise levels near different road surfaces.	JB	Before next meeting.

Agenda item: 5 Other Agenda Items **Presenter:** John Turner

Discussion:

Questions raised by Kieron Rochester addressed, noted in the powerpoint presentation and discussed. See Item 4.

Agenda item: 6 General Business **Presenter:** John Turner

Discussion:

No general business from BD, SD, KD, JB, JM, DW, WS.

PB. Contractors onsite have raised the matter of unauthorized entry into the site of bikes and people. Request that the CCC help spread the fact that the site is a construction site and access, if needed should be arranged with PB prior to coming onto site.

JT. Does anyone have any additional requests or comments for future agendas? The current agenda is one adopted from DPIE guidelines.

All. No changes requested to current agenda.

Action items	Person responsible	Deadline
✓ Community to advise where possible about dangers of construction site and not accessing the site without contacting PB.	CCC	Where possible.
✓ Agreed no change to meeting agenda.	JT to maintain existing agenda	NA
✓ Include note in newsletter about not accessing site during construction.	JB / PB	In next newsletter.

Agenda item: 7 Next Meeting **Presenter:** John Turner

Discussion:

JT. Typical to have four meetings per year as suggested by DPIE.

All. Agreed by all CCC members present on four meetings per year.

JT. Next meeting would be good to have a site inspection if feasible given stage of works.

JT. A meeting in late January 2020 would be next appropriate time.

Action items	Person responsible	Deadline
✓ Agreed four meetings appropriate.	JT to arrange meetings	Next meeting late January 2020
✓ Site inspection agreed next visit, subject to operational restrictions if applicable.	PB	Immediately before next meeting.

Other Information

- **Minutes to be provided as draft in the next week.**
- **Committee members have one week to provide feedback on the minutes to the Chairperson.**
- **Within two weeks of receiving feedback the minutes will be finalized and distributed to members and placed on the website.**
- **SD and KR requested hard copy and the electronic copy. Hard copy to be dropped off in mail box.**

Meeting Close:

10:08 am

Newcastle Sand

Community Consultative Committee Update

11 October 2019

Key Activities Completed for Construction

- Completed management plans and gained EPL.
- Established www.newcastlesand.com.au
- Established air monitors.
- Collecting surface water and groundwater on monthly basis.
- Surveyed construction footprint.
- Surveyed and markout of habitat trees.
- Collected seed from cleared vegetation.
- Mulched understorey vegetation.

Key Activities Completed for Construction

- Cleared trees.
- Removed dumped waste and cars.
- Installed security cameras.
- Removed and stockpiled topsoil.
- Excavated sand to quarry floor to enable construction of access road, construction compound, weighbridge, office and workshop area.
- Excavated sand is stockpiled for future processing.
- Commenced laying road base for access road.
- Spread topsoil on batters for revegetation.

Key Construction Activities Remaining

- Install demountable office and workshop buildings.
- Install weighbridge.
- Install power and water.
- Construct intersection.
- Commission processing plant.
- Commence processing and sale of sand products.

Environmental Monitoring - Water

- Continuous logging of groundwater depth data at several wells across site.
- Gauge depth and sample 8 groundwater wells and 4 surface water sites across the site monthly – reports on the website.
- Groundwater levels have been very low.
- PFAS has been analysed in all bores.
- PFOS detected at low levels in drain at eastern boundary of property.
- PFDS detected in bore once at the limit of reporting near road (1.5m below quarry floor), followup sampling did not detect it again.
- Low level of hydrocarbon detected at BH4 near road in April and September following rainfall. May suggest past vehicle accident?
- PFAS levels consistent with Defence plume mapping, only occurred following rainfall.

Environmental Monitoring - Air

- Network includes two Beta Attenuation Monitors (BAMs) that measure real-time particulate matter smaller than 10 micron (PM_{10}).
  - Have a 6 stage alarm configured to help manage dust levels.
  - Have had some teething problems (sporadic data peaks without likely dust, insects, theft of fence, potential localised surface dust).
  - Have had first quarterly calibration at start of October.
- Two High Volume Air Sampler (HVAS) one measuring PM10 and one measuring total suspended particulates (TSP), these run for 24 hours every six days.

Environmental Monitoring - Air

- Quarry must implement all reasonable and feasible avoidance and mitigation measures so particulate emissions from quarry do not cause exceedance of:
  - PM10 annual average 25 $\mu g/m^3$ cumulative.
  - Quarry PM10 contribution over 24 hour average 50 $\mu g/m^3$.
- BAM at 393 Cabbage Tree Road = 19.1 $\mu g/m^3$ average since install.
- BAM at 458 Cabbage Tree Road = 17.5 $\mu g/m^3$ average since install.
- Air quality model in assessment used an assumed annual average background of 19.4$\mu g/m^3$.
- Measured 24 hour average went above 50 $\mu g/m^3$ over a weekend at the time of a regional dust storm. Water cart was used onsite to help reduce dust levels, no other work was occurring onsite.

Questions

Q. Operating days during construction & operations – can these be confirmed including any specific exceptions for certain tasks.

R. See Schedule 1, Condition 1 of consent. Construction is 7am to 6pm Monday to Friday and 8am to 1pm on Saturday. Quarrying operations will start when weighbridge and intersection completed.

Hours of Operation

1. The Applicant must comply with the operating hours set out in Table 1.

Table 1: Operating Hours

Activity	*Permissible Hours*
Quarrying operations	• 7 am to 5 pm Monday to Friday • 7 am to 4 pm Saturday • At no time on Sundays or public holidays
Loading and dispatch of laden trucks	• 6 am to 6 pm Monday to Friday • 7 am to 4 pm Saturday • At no time on Sundays or public holidays
Maintenance	• May be conducted at any time, provided that these activities are not audible at any privately-owned residence

Questions

Q. Traffic management during construction – can the left turn only operations rule be implemented for all vehicles to increase safety?

R. At this stage, before the intersection works, light vehicles are considered OK to turn right consistent with all residential properties.

Q. Approved works during construction – what trucks if any should be leaving the site loaded ?

R. Essentially any trucks would be permitted to leave site loaded providing that material is part of construction and is not sold.

Q. Start times during construction / operations – definition of start – please confirm no vehicles or machines arrive/depart, start up or shutdown unless within approved times.

R. The assessment noted that light vehicles will arrive before start times to conduct tool-box talks and inspect machines. This applies to construction and operations. It is noted in the consent that maintenance can be conducted at any time providing it is not audible at private residences.

Questions

Q. Reversing beepers – should the broadband beepers be used for construction activities as well ?

R. Where possible machinery with broadband beepers have been selected, unfortunately this is not always feasible with short term contracts during construction. Operational plant will all be fitted with broad band beepers.

Q. Would like some clarity on these issues for the community as there have been instances where all above have been seen.

R. If there are concerns, we encourage residents to record in a journal, or call the information line at the time of the observation.

Q. With regards to the timing for the next CCC, given construction will now be continuing over the busy Christmas period I would suggest a meeting before the RMS compulsory closure period if that is possible.

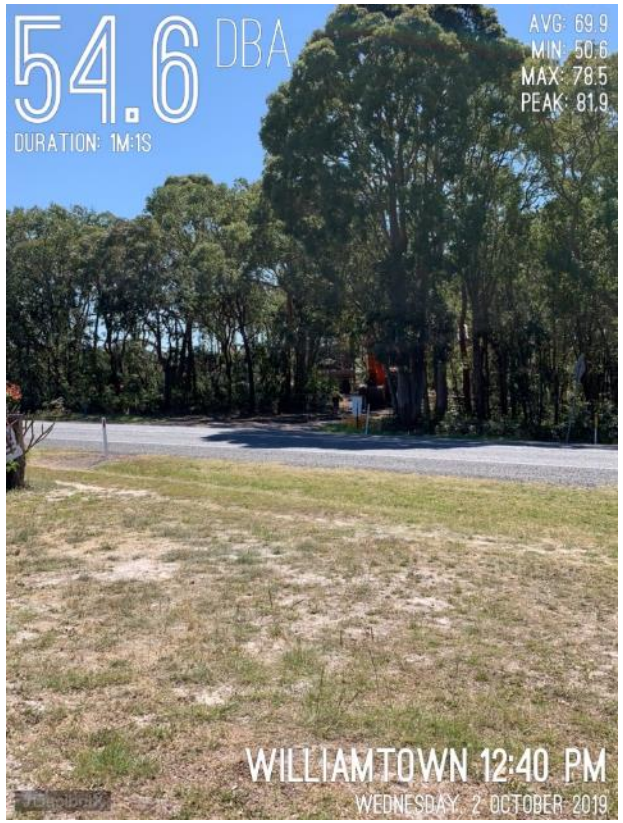
R. Up to the CCC.

More Information

- www.newcastlesand.com.au
- Quarry Manager – Paul Bourne - 0402 648 079

Noise evaluation (not formal monitoring)

Noise from site around 55 dBA versus traffic on CBT Road at 75 dBA



Testing polymers to reduce dust

Air monitors
(HVAS – PM10 not shown)

The site on 11 October 2019

The site on 11 October 2019

APPENDIX 4. NEWSLETTERS

Cabbage Tree Road Sand Quarry

Welcome to **Edition 4** of the Cabbage Tree Road Sand Quarry Newsletter. The purpose of the newsletter is to provide the community with updates on how the project is progressing.

Since the last newsletter in October 2016, the proposed sand quarry received approval from the Joint Regional Planning Panel (JRPP). The JRPP approved the quarry on 9 May 2018 subject to a comprehensive set of Consent Conditions.

Williamtown Sand Syndicate (WSS) has been developing management plans in consultation with government agencies and to the satisfaction of the Secretary of New South Wales (NSW) Department of Planning Industry and Environment (DPIE). WSS has also been working with the NSW Roads and Maritime Service (RMS) to develop detailed plans for the construction of the intersection on Cabbage Tree Road.

START OF CONSTRUCTION

Construction of the intersection, workshop and office area is anticipated to start in August, pending final approval of the intersection design details by the RMS. Construction is expected to take approximately 12 weeks. On this basis quarrying and processing of sand is expected to begin in November 2019. Construction of the intersection and roads will be undertaken by a major earth moving contractor, supported by WSS.

Construction will include building the following:

- A left-in and left-out intersection onto Cabbage Tree Road.
- A bitumen sealed access road.
- The erection of a koala exclusion fence along the boundary of 282B Cabbage Tree Road.
- A workshop, office, and weighbridges.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Under the Project's Conditions of Development Consent, WSS must consult with the landowners adjacent to the proposed intersection to minimise the effects of its construction on residents. A Road Construction Management Plan must be developed to consider noise, vibration, dust, and property access impacts of the construction impacts and set out ways to avoid, minimise or offset impacts or provide respite for affected residents from extended periods of construction. WSS have developed a Construction Environmental Management Plan (CEMP) to document these controls. A copy of the CEMP is available to any interested resident for review (see contacts below), and to provide input into controls. A summary of the key controls are provided below. This newsletter is intended to form the basis for plan consultation and encourage input to its refinement.

Vibration

Given the setback of properties from Cabbage Tree Road, no vibration impacts to structures are considered likely to occur. Notwithstanding, landowners within 300 m of the intersection are entitled to make a written request for WSS to engage an independent qualified person to undertake a baseline condition assessment of the structures on their property. In the event of damage, expected by the landowner to be caused by quarry construction activities, the landowner may request further assessment of any damage and if caused by the quarry agree for WSS to repair that damage. The properties within 300 m of the intersection works include numbers; 447, 444, 441, 435, 431, 425, 415, 409, 407, 397, 393, 383, 379, 375, 373, 365, 363, 350, 343, 340 and 336 Cabbage Tree Road, Williamtown.

Noise

Construction will be undertaken during the standard industry construction hours of 7 am to 6 pm Monday to Friday, 8 am to 1 pm on Saturdays with no works occurring on Sunday or a Public Holiday. The noise assessment anticipates that some properties may be noise affected (background plus 10 dB) for some portion of the works, but no

dwelling would be highly noise affected (75 dB(A) or higher). Noise monitoring will be undertaken during construction to assess noise levels.

Dust

Standard dust controls will be applied during construction (e.g. minimise disturbance area, water cart, stabilise bare sand areas as soon as feasible). An air quality monitoring network has been established for the project and includes an air monitor directly opposite the intersection. This air monitor will provide the quarry operators a real-time measurement of air quality and the ability to proactively respond to increasing dust levels from construction to minimise impacts on nearby residents.

Property Access and Traffic

The construction of the intersection will require the implementation of a traffic management plan to the satisfaction the RMS. The traffic management plan will be developed with the successful earth moving contractor, but is considered likely to include; closure of the east-bound road shoulder in the area of the intersection, reduced speed limits and construction warning signage. Despite these controls, during the works, it will be important for residents and visitors of properties opposite the works area to take care accessing the property and preferably access them from the west bound lane as there will be no shoulder available for vehicles to overtake turning traffic.

Input and Feedback

Should residents have any questions, suggestions or concerns in relation to the management plan and proposed construction works, please contact Jonathan on the details below. Prior to the commencement of construction, additional details of the construction manager will be provided.

COMMUNITY CONSULTATIVE COMMITTEE

The DPIE appointed John Turner as the Independent Chair Person for the Cabbage Tree Road Quarry Community Consultative Committee (CCC). Public notices calling for CCC members has been made and the CCC is in the process of being formed. If you are interested in being a member or finding out more about the CCC please contact John at ctrsqccc@gmail.com.

CONTACT US

If you have any comments or would like more information, or have any questions or feedback relating to the Cabbage Tree Road Project, please contact:

Jonathan Berry (Kleinfelder Australia Pty Ltd)
P: 02 4949 5200 (business hours)
M: 0421 440 139
E: jberry@kleinfelder.com

ABOUT WILLIAMTOWN SAND

Williamtown Sand Syndicate Pty Ltd is a Newcastle based privately funded investment business utilising local employees, contractors, consultants, resources and suppliers of services to undertake this project.

Cabbage Tree Road Sand Quarry

Welcome to **Edition 5** of the Cabbage Tree Road Sand Quarry Newsletter. The purpose of this newsletter is to provide the community with updates on how the project is progressing, and to notify of the forthcoming commencement of construction.

The previous newsletter in July 2019 informed that the proposed sand quarry received approval from the Joint Regional Planning Panel (JRPP). This should have stated that approval was received from the Independent Planning Commission on 9 May 2018.

Since the last newsletter in July 2019, Williamtown Sand Syndicate (WSS) has been finalising management plans in consultation with government agencies and to the satisfaction of the Secretary of New South Wales (NSW) Department of Planning Industry and Environment (DPIE). WSS has also been working with the NSW Roads and Maritime Service (RMS) to finalise detailed plans for the construction of the intersection on Cabbage Tree Road.

START OF CONSTRUCTION

Internal construction works will commence on 26 August 2019.

Construction of the intersection is expected to commence in mid-September 2019 pending final approval of the intersection design details by the RMS. Construction is expected to take approximately 12 weeks. Construction of the intersection and roads will be undertaken by an experienced earth moving contractor, supported by WSS.

On this basis quarrying and processing of sand is expected to begin in December 2019 / January 2020.

PHASES OF CONSTRUCTION

Phases of construction are anticipated to be as follows:

1. Marking of boundaries.
2. Vegetation Clearing.
3. Internal earthworks to establish work compounds and internal road and office areas.
4. Construction of intersection with traffic controls (as detailed below)
5. Relocation of services including installation of two live power poles and installation of two permanent streetlights. It is not anticipated that this will result in the requirement for power outages. Likewise, water or telecommunications will not be interrupted during construction.
6. As intersection construction nears completion, short term (approx. 1 day) temporary lane closure may be required, managed by traffic controllers.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

Under the Project's Conditions of Development Consent, WSS must consult with landowners adjacent to the proposed intersection to minimise the effects of its construction on residents. The previous newsletter in July 2019 informed of a copy of the CEMP is available to any interested resident for review (see contacts below), and to provide input into controls. Feedback has been received from stakeholders including DPIE and captured in the CEMP where applicable. WSS encourage ongoing feedback to ensure construction activities are completed with minimal disruption to the surrounding community.

KEY CONSTRUCTION CONTROLS

Vibration

Given the setback of properties from Cabbage Tree Road, vibration impacts to structures are considered unlikely. Regardless, landowners within 300 m of the intersection are entitled to make a written request for WSS to engage an independent qualified person to undertake a baseline condition assessment of the structures on their property. In the event of damage, suspected by the landowner to be caused by quarry construction activities, the landowner may request further assessment of any

damage and if caused by the quarry agree for WSS to repair that damage. The properties within 300 m of the intersection and quarry include numbers; 464, 458, 457, 452, 451, 447, 444, 441, 435, 431, 425, 415, 409, 407, 397, 393, 383, 379, 375, 373, 365, 363, 350, 343, 340 and 336 Cabbage Tree Road, Williamtown. If you would like to have your property inspected, please contact Jonathan on the details below. For those that have requested a survey, an appointment will be arranged directly with you in the coming fortnight to undertake the inspection.

Noise

Construction will be undertaken during standard industry construction hours of 7 am to 6 pm Monday to Friday, 8 am to 1 pm on Saturdays with no works occurring on Sunday or a Public Holiday. The noise assessment anticipates that some properties may be noise affected (background plus 10 dB) for some portion of the works, and that the worst case construction noise impact is predicted to be 62 dB(A), but no dwelling is predicted be highly noise affected (75 dB(A) or higher). Noise monitoring will be undertaken during construction to assess noise levels.

Dust

Standard dust controls will be applied during construction (e.g. minimise disturbance area, water cart, stabilise bare sand areas as soon as feasible). Further, an air quality monitoring network has been installed to provide a real-time measurement of air quality and the ability to proactively respond to any increasing dust levels from construction to minimise impacts on nearby residents.

Property Access and Traffic

The construction of the quarry intersection will require the implementation of a traffic management plan to the satisfaction the RMS. Traffic controls applied for the construction of the intersection will include:

- Reduction in speed to 60km/h approximately 100 m before and after the intersection.
- Closure of the east-bound road shoulder in the area of the intersection.
- Lane separation using concrete barriers.
- Construction warning signage.
- As intersection construction nears completion, short term (approx. 1 day) temporary east-bound lane closure will be required to cut-in the intersection. This would be managed by traffic controllers, using a contra-flow on the west bound lane.

Despite these controls, during the works, it will be important for residents and visitors of properties opposite the works area to preferably access them from the west bound lane as there will be no shoulder available for vehicles to overtake turning traffic.

COMMUNITY CONSULTATIVE COMMITTEE

The DPIE appointed John Turner as the Independent Chair Person for the Cabbage Tree Road Quarry Community Consultative Committee (CCC). The members of the CCC have now been selected based on registrations of interest. For more about the CCC please contact John at ctrsqccc@gmail.com.

CONTACT US

If you have any comments or would like more information, or have any questions or feedback relating to the Cabbage Tree Road Project, please contact:

Jonathan Berry (Kleinfelder Australia Pty Ltd)
P: 02 4949 5200 (business hours)
M: 0421 440 139
E: jberry@kleinfelder.com

To make a complaint or find out more about the construction activities occurring onsite contact the Quarry Manager on 0402 648 079. This number is the dedicated quarry complaints and information number.

ABOUT WILLIAMTOWN SAND

Williamtown Sand Syndicate Pty Ltd is a Newcastle based privately funded investment business utilising local employees, contractors, consultants, resources and suppliers of services to undertake this project.

Cabbage Tree Road Sand Quarry

Welcome to **Edition 6** of the Cabbage Tree Road Sand Quarry Newsletter. The purpose of this newsletter is to provide the community with updates on how the project is progressing. As you may have noticed, internal construction works have been progressing and we appreciate your patience and understanding during this period.

Williamtown Sand Syndicate (WSS) have now finalised design approval with the Roads and Maritime Service (RMS) for the intersection on Cabbage Tree Road.

Internal construction works are nearing completion with the majority of the bulk earthworks and road building activities anticipated to be completed by the end of November 2019. Facility establishment including the weighbridge, office installation, storage shed, and services will continue at a lesser scale from the 2nd December 2019 until the opening of the quarry.

INTERSECTION CONSTRUCTION & PROPERTY ACCESS

Intersection construction works are anticipated to commence from Monday 2nd December 2019. WSS has appointed Robson Civil as the contractor to construct the intersection. Robson has extensive experience in constructing similar projects throughout the Hunter and Central Coast regions.

The construction of the intersection will occur as per the RMS approved management plans, traffic control and design specifications with periodic RMS Surveillance Office inspections.

The approved traffic control plan will be enforced for the duration of the project (RMS - Road Occupancy Licence), a copy of the traffic control plan is attached to this newsletter for your information, the main controls of this plan are;

- Reduced speed from 90kph to 60kph in both directions for the extent of the work-zone for the duration of the project;
- Lane separation using concrete barriers.
- Concrete barriers located on the east-bound existing shoulder for the extent of the work-zone; and
- Interim (as required) stop go traffic control for both east and west-bound travel lanes.
- Closure of the east-bound road shoulder in the area of the intersection.
- Construction warning signage
- As intersection construction nears completion, short term (approx. 1 day) temporary east-bound lane closure will be required to cut-in the intersection. This would be managed by traffic controllers, using a contra-flow on the west bound lane.

Despite these controls, during the works, it will be important for residents and visitors of properties opposite the works to preferably access theses from the west bound lane as there will be no shoulder available for vehicles to overtake turning traffic (Note traffic will be slowed to 60kph).

It is anticipated the intersection construction will be completed by late February 2020.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

Under the Project's Conditions of Development Consent, WSS must consult with landowners adjacent to the proposed intersection to minimise the effects of its construction on residents. The previous newsletter in August 2019 informed of a copy of the CEMP is available to any interested resident for review (see contacts below), and to provide input into controls. Feedback has been received from stakeholders including DPIE and captured in the CEMP where applicable. WSS encourage ongoing feedback to ensure construction activities are completed with minimal disruption to the surrounding community.

KEY CONSTRUCTION CONTROLS

Vibration

Given the setback of properties from Cabbage Tree Road, vibration impacts causing structural damage is considered unlikely. Regardless, landowners within 300 m of the intersection (and quarrying area) are entitled to make a written request for WSS to

engage an independent qualified person to undertake a baseline condition assessment of the structures on their property. In the event of damage, suspected by the landowner to be caused by quarry construction activities, the landowner may request further assessment of any damage and if caused by the quarry agree for WSS to repair that damage. The properties within 300 m of the intersection and quarry include numbers; 464, 458, 457, 452, 451, 447, 444, 441, 435, 431, 425, 415, 409, 407, 397, 393, 383, 379, 375, 373, 365, 363, 350, 343, 340 and 336 Cabbage Tree Road, Williamtown. If you would like to have your property inspected, please contact Jonathan on the details below. For those that have requested a survey, an appointment will be arranged directly with you in the coming fortnight to undertake the inspection.

Noise

Construction will be undertaken during standard industry construction hours of 7 am to 6 pm Monday to Friday, 8 am to 1 pm on Saturdays with no works occurring on Sunday or a Public Holiday. The noise assessment anticipates that some properties may be noise affected (background plus 10 dB) for some portion of the works, and that the worst case construction noise impact is predicted to be 62 dB(A), but no dwelling is predicted be highly noise affected (75 dB(A) or higher). Noise monitoring will be undertaken during construction to assess noise levels.

Dust

Standard dust controls will be applied during construction (e.g. minimise disturbance area, water cart, stabilise bare sand areas as soon as feasible). Further, an air quality monitoring network has been installed to provide a real-time measurement of air quality and the ability to proactively respond to any increasing dust levels from construction to minimise impacts on nearby residents.

ACCESSING THE SITE AND YOUR SAFETY

WSS would like to remind the community that the property on which the quarrying is occurring is both a construction site and operating quarry. For your safety, **no unauthorised access is permitted on the land**. If you would like to access the site, please contact the quarry manager, who will, where possible, assist with your request.

COMMUNITY CONSULTATIVE COMMITTEE

The DPIE appointed John Turner as the Independent Chair Person for the Cabbage Tree Road Quarry Community Consultative Committee (CCC). The members of the CCC have now been selected based on registrations of interest. For more about the CCC please contact John at harcourt2204@hotmail.com.

QUARRY MANAGER

Paul Bourne has been appointed the role of Quarry Manager at WSS. Paul brings with him many years of sand quarrying experience within the local area.

To make a complaint or find out more about the construction activities occurring onsite contact Paul on 0402 648 079. This number is the dedicated quarry complaints and information number.

CONTACT US

If you have any comments or would like more information, or have any questions or feedback relating to the Cabbage Tree Road Project, please contact:

Jonathan Berry (Kleinfelder Australia Pty Ltd)
P: 02 4949 5200 (business hours)
M: 0421 440 139
E: jberry@kleinfelder.com

ROBSON CIVIL SITE CONTACT

Phil Badior – Site Manager
P: 02 4949 1300
M: 0439 609 339

ABOUT WILLIAMTOWN SAND

Williamtown Sand Syndicate Pty Ltd is a Newcastle based privately funded investment business utilising local employees, contractors, consultants, resources and suppliers of services to undertake this project.

Client: ROBSON CIVIL PROJECTS
Contact: Brent Matthews
PH: 0477 027 660

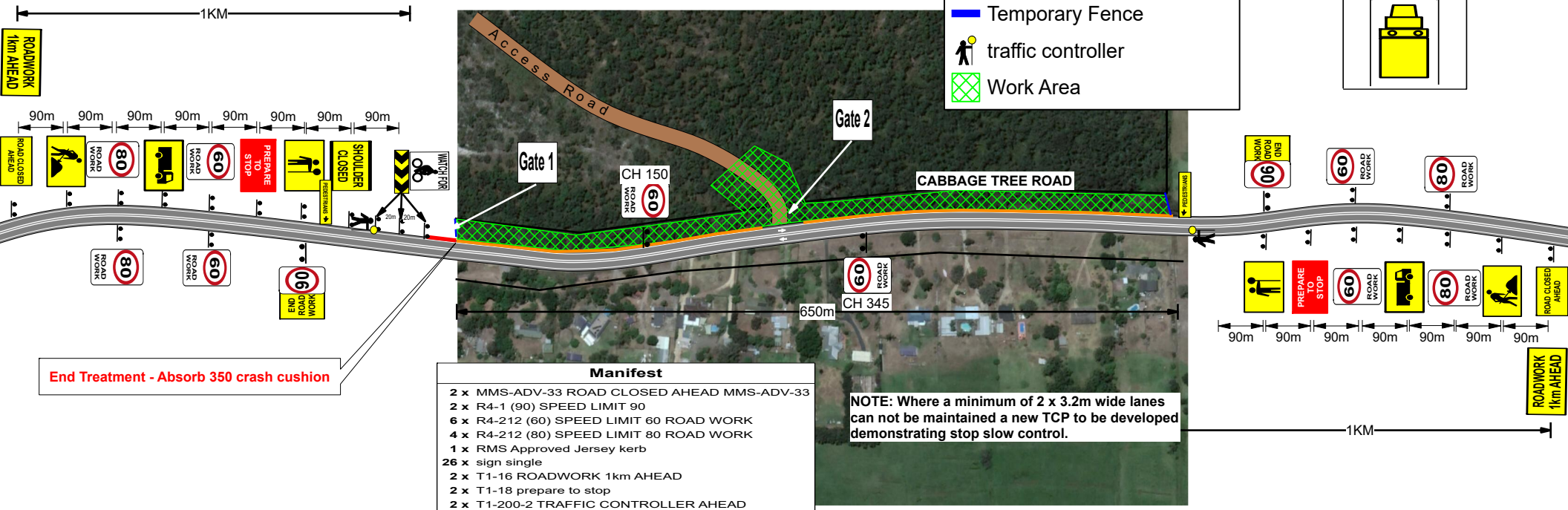
DAY WORKS - SHOULDER CLOSED WITH BRIEF STOPS AS REQUIRED

Coast Traffic Solutions
Traffic Control
coasttrafficsolutions@gmail.com 0412 444 156

Legend

- Property Boundry
- RMS Approved Jersey kerb
- Temporary Fence
- traffic controller
- Work Area

Minimum travel lanes = 3.2m



Manifest

- 2 x MMS-ADV-33 ROAD CLOSED AHEAD MMS-ADV-33
- 2 x R4-1 (90) SPEED LIMIT 90
- 6 x R4-212 (60) SPEED LIMIT 60 ROAD WORK
- 4 x R4-212 (80) SPEED LIMIT 80 ROAD WORK
- 1 x RMS Approved Jersey kerb
- 26 x sign single
- 2 x T1-16 ROADWORK 1km AHEAD
- 2 x T1-18 prepare to stop
- 2 x T1-200-2 TRAFFIC CONTROLLER AHEAD
- 2 x T1-5-2 WORKERS AHEAD NSW
- 2 x T2-17A end road work
- 2 x T2-25 TRUCKS
- 1 x T5-4 HAZARD WARNING MARKER
- 1 x T8-2L pedestrians (L)
- 1 x T8-2R pedestrians (R)
- 2 x traffic controller
- 1 x Watch for Cyclist

NOTE: Where a minimum of 2 x 3.2m wide lanes can not be maintained a new TCP to be developed demonstrating stop slow control.

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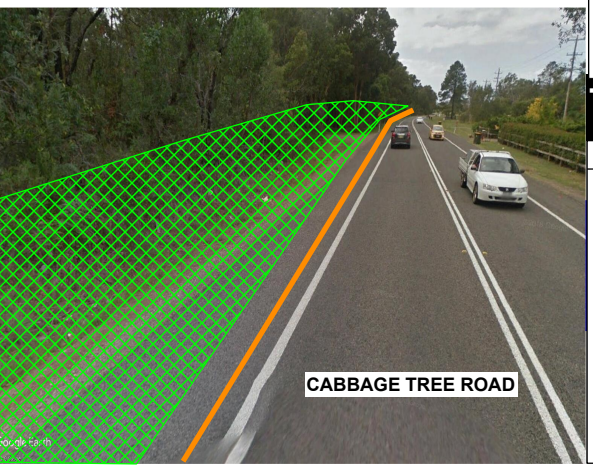

TCP 1 - Cabbage Tree Rd - Williamtown - Shoulder Closed - Long Term

Date: 18/11/2019 **Scale:** NOT TO SCALE **Revision:** 0

Comments:

1. SCOPE OF WORKS: Traffic management during Long term road construction & associated works.
2. Day Works: All appropriate PPE to be warn.
3. PEDESTRIANS: Ensure pedestrian signage is clearly posted and surface on temporary walk way smooth and with out obstacles.
4. CERTIFIED TRAFFIC CONTROLLERS: All signage & equipment as per this TCP are to be positioned by holder of a current traffic controller Yellow Card.
5. TCP No 1: Based on TCP 42 from the TCWS manual.
6. SCHEDULE OF WORKS: TBA by Robson Projects.
7. NOTE: When workers are not on site the worker symbolic signs will be removed or covered

GENERAL NOTES: This plan is to be read in conjunction with:

* TRAFFIC CONTROL AT WORKS SITES MANUAL 27-07-2018 - VERSION No 5
* None applicable existing signs to be covered.

Modified by:
Red Card No:
Date: Sign:

Certified by:
Red Card No:
Date: / /201 Sign:

Plan drawn by
Nigel Bolton

Phone
0412 444 156

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Card No. 0049082211
This qualification enables you to prepare Traffic Management Plans and conduct inspections on Traffic Management Plans.
NIGEL BOLTON
Expiry Date: 12/01/2021
Card No: 0049082211
This card is not a proof of identity.

Client: ROBSON CIVIL PROJECTS
Contact: Brent Matthews
PH: 0477 027 660

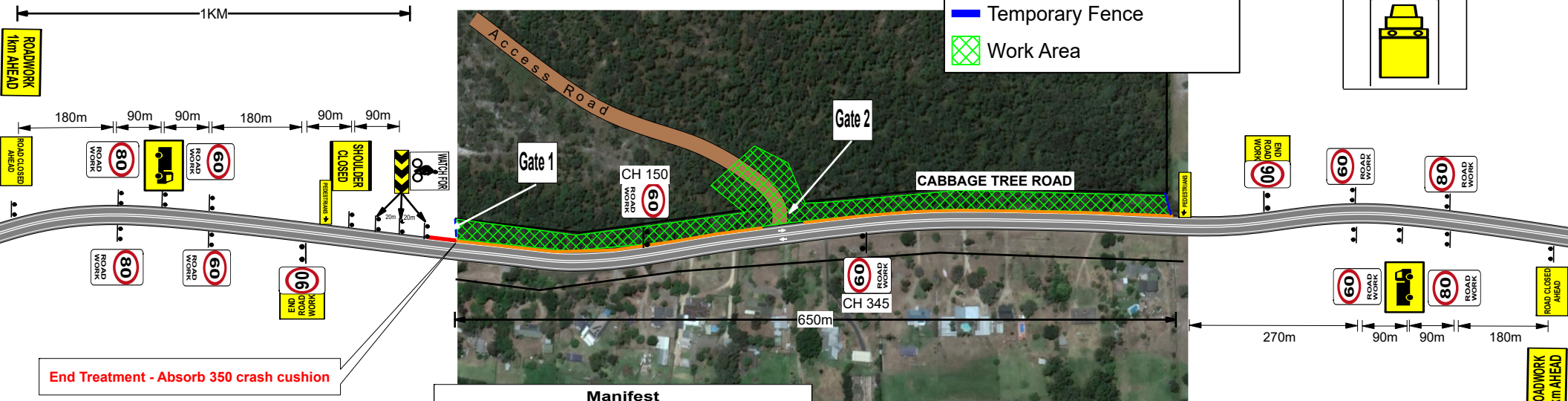
OUT OF HOURS - SHOULDER CLOSED

Coast Traffic Solutions
Traffic Control
coasttrafficsolutions@gmail.com 0412 444 156

Legend

- Property Boundry
- RMS Approved Jersey kerb
- Temporary Fence
- Work Area

Minimum travel lanes = 3.2m



Manifest

2 x	MMS-ADV-33 ROAD CLOSED AHEAD MMS-ADV-33
2 x	R4-1 (90) SPEED LIMIT 90
6 x	R4-212 (60) SPEED LIMIT 60 ROAD WORK
4 x	R4-212 (80) SPEED LIMIT 80 ROAD WORK
1 x	RMS Approved Jersey kerb
20 x	sign single
2 x	T1-16 ROADWORK 1km AHEAD
2 x	T2-17A end road work
2 x	T2-25 TRUCKS
1 x	T5-4 HAZARD WARNING MARKER
1 x	T8-2L pedestrians (L)
1 x	T8-2R pedestrians (R)
1 x	Watch for Cyclist

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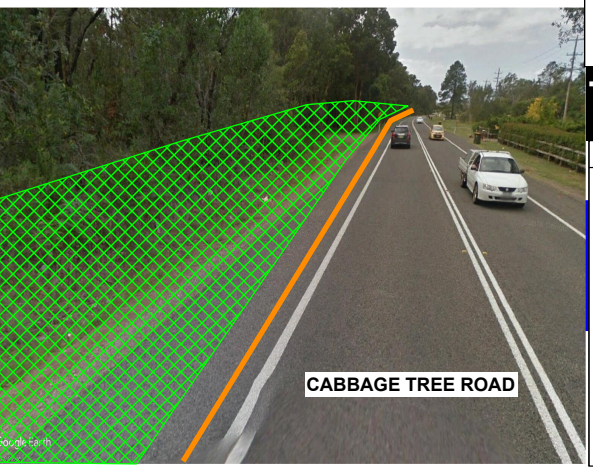

TCP 2 - Cabbage Tree Rd - Williamtown - Shoulder Closed - OUT OF HOURS

Date: 20/11/2019 **Scale:** NOT TO SCALE **Revision:** 0

Comments:

1. SCOPE OF WORKS: Traffic management OUT OF HOURS Long term road construction & associated works.
2. Day Works: All appropriate PPE to be warn.
3. PEDESTRIANS: Ensure pedestrian signage is clearly posted and surface on temporary walk way smooth and with out obstacles.
4. CERTIFIED TRAFFIC CONTROLLERS: All signage & equipment as per this TCP are to be positioned by holder of a current traffic controller Yellow Card.
5. TCP No 2: Based on TCP 42 from the TCWS manual.
6. SCHEDULE OF WORKS: TBA by Robson Projects.
7. NOTE: When workers are not on site the worker symbolic signs will be removed or covered

GENERAL NOTES: This plan is to be read in conjunction with:
* TRAFFIC CONTROL AT WORKS SITES MANUAL 27-07-2018 - VERSION No 5
* None applicable existing signs to be covered.

Modified by:
Red Card No:
Date: Sign:

Certified by:
Red Card No:
Date: / /201 Sign:

Plan drawn by
Nigel Bolton
Phone
0412 444 156

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This qualification enables you to prepare Traffic Management Plans and conduct inspections on Traffic Management Plans.
NIGEL BOLTON
Expiry Date: 12/01/2021
Card No: 0049082211
This card is not a proof of identity.

Client: ROBSON CIVIL PROJECTS
Contact: Brent Matthews
PH: 0477 027 660

DAY WORKS - Stop Slow Control - Western end of works

Legend

- Cone
- Property Boundry
- RMS Approved Jersey kerb
- Temporary Fence
- traffic controller
- Work Area

Coast Traffic Solutions
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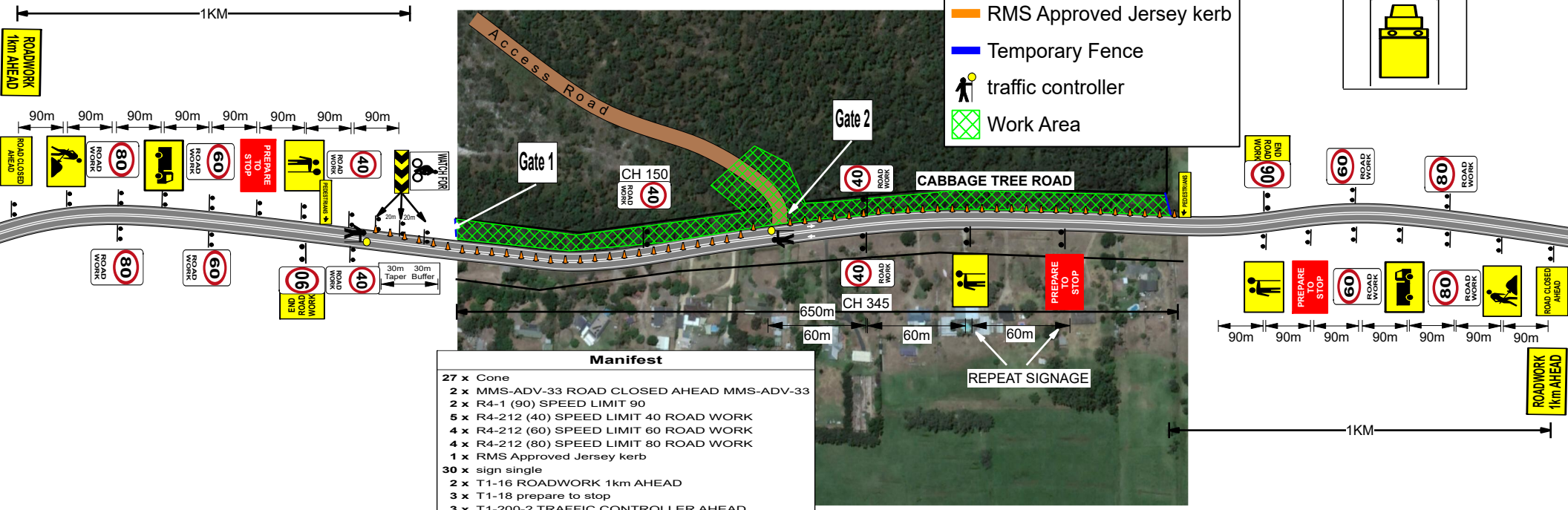
coasttrafficsolutions@gmail.com 0412 444 156

Minimum travel lanes = 3.2m



Manifest

27 x	Cone
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2 x	R4-1 (90) SPEED LIMIT 90
5 x	R4-212 (40) SPEED LIMIT 40 ROAD WORK
4 x	R4-212 (60) SPEED LIMIT 60 ROAD WORK
4 x	R4-212 (80) SPEED LIMIT 80 ROAD WORK
1 x	RMS Approved Jersey kerb
30 x	sign single
2 x	T1-16 ROADWORK 1km AHEAD
3 x	T1-18 prepare to stop
3 x	T1-200-2 TRAFFIC CONTROLLER AHEAD
2 x	T1-5-2 WORKERS AHEAD NSW
2 x	T2-17A end road work
2 x	T2-25 TRUCKS
1 x	T5-4 HAZARD WARNING MARKER
1 x	T8-2L pedestrians (L)
1 x	T8-2R pedestrians (R)
2 x	traffic controller
1 x	Watch for Cyclist

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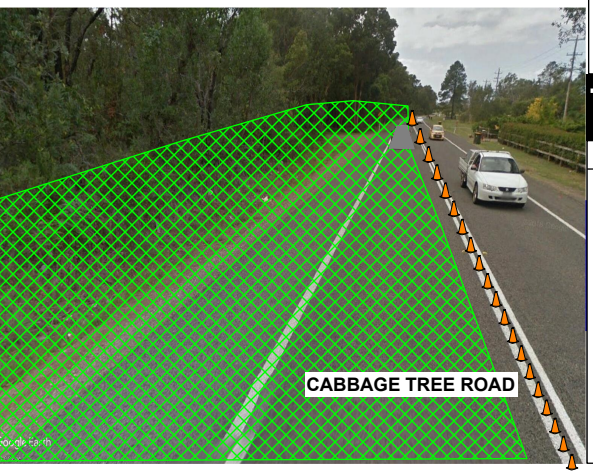

TCP 3 - Cabbage Tree Rd - Williamtown - Stop Slow Control

Date: 20/11/2019 **Scale:** NOT TO SCALE **Revision:** 0

Comments:

1. SCOPE OF WORKS: Traffic management during Long term road construction & associated works.
2. Day Works: All appropriate PPE to be warn.
3. PEDESTRIANS: Ensure pedestrian signage is clearly posted and surface on temporary walk way smooth and with out obstacles.
4. CERTIFIED TRAFFIC CONTROLLERS: All signage & equipment as per this TCP are to be positioned by holder of a current traffic controller Yellow Card.
5. TCP No 3: Based on TCP 83 from the TCWS manual.
6. SCHEDULE OF WORKS: TBA by Robson Projects.
7. NOTE: When workers are not on site the worker symbolic signs will be removed or covered

GENERAL NOTES: This plan is to be read in conjunction with:
* TRAFFIC CONTROL AT WORKS SITES MANUAL 27-07-2018 - VERSION No 5
* None applicable existing signs to be covered.

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Red Card No:
Date: Sign:

Certified by:
Red Card No:
Date: / /201 Sign:

Plan drawn by
Nigel Bolton
Phone
0412 444 156

Client: ROBSON CIVIL PROJECTS
Contact: Brent Matthews
PH: 0477 027 660

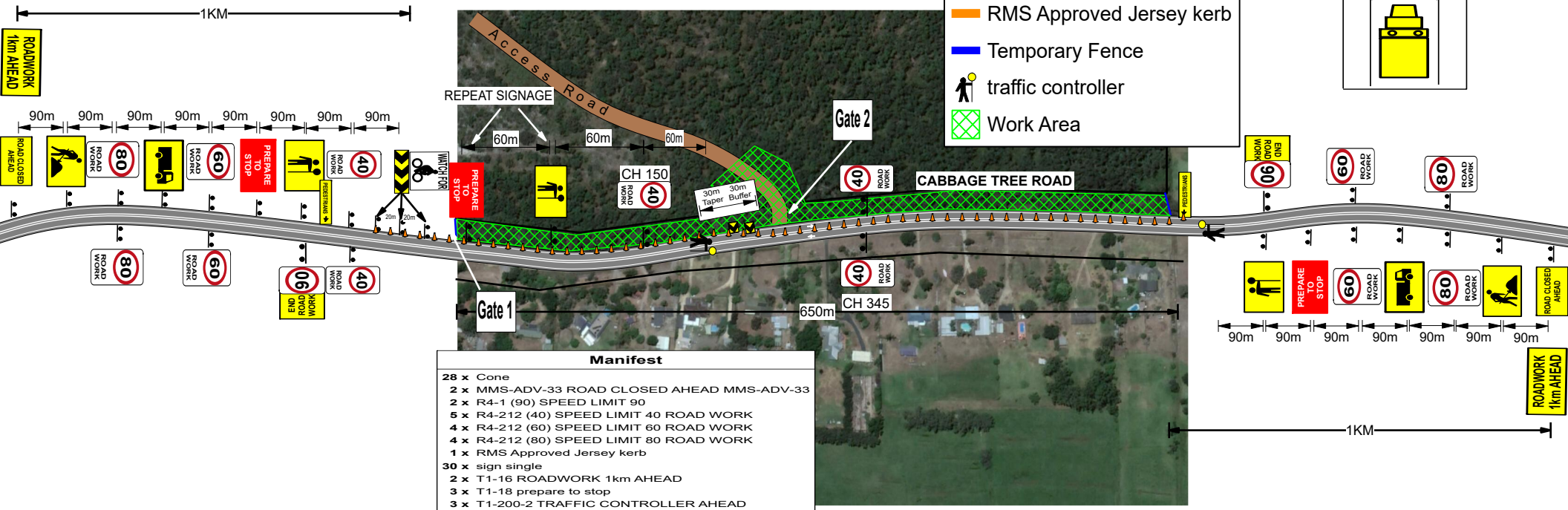
DAY WORKS - Stop Slow Control - Eastern end of works

Coast Traffic Solutions
Traffic Control
coasttrafficsolutions@gmail.com 0412 444 156

Legend

- Cone
- Property Boundry
- RMS Approved Jersey kerb
- Temporary Fence
- traffic controller
- Work Area

Minimum travel lanes = 3.2m



Manifest

28 x	Cone
2 x	MMS-ADV-33 ROAD CLOSED AHEAD MMS-ADV-33
2 x	R4-1 (90) SPEED LIMIT 90
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4 x	R4-212 (60) SPEED LIMIT 60 ROAD WORK
4 x	R4-212 (80) SPEED LIMIT 80 ROAD WORK
1 x	RMS Approved Jersey kerb
30 x	sign single
2 x	T1-16 ROADWORK 1km AHEAD
3 x	T1-18 prepare to stop
3 x	T1-200-2 TRAFFIC CONTROLLER AHEAD
2 x	T1-5-2 WORKERS AHEAD NSW
2 x	T2-17A end road work
2 x	T2-25 TRUCKS
1 x	T5-4 HAZARD WARNING MARKER
2 x	T5-5 T5-5 single chevron
1 x	T8-2L pedestrians (L)
1 x	T8-2R pedestrians (R)
2 x	traffic controller
1 x	Watch for Cyclist

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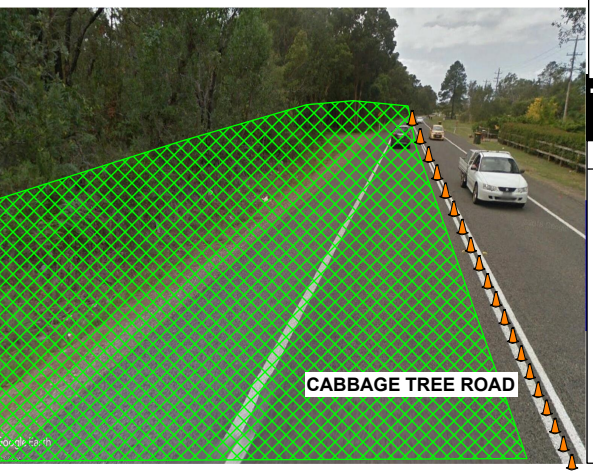

TCP 4 - Cabbage Tree Rd - Williamtown - Stop Slow Control

Date: 20/11/2019 **Scale:** NOT TO SCALE **Revision:** 0

Comments:

1. SCOPE OF WORKS: Traffic management during Long term road construction & associated works.
2. Day Works: All appropriate PPE to be warn.
3. PEDESTRIANS: Ensure pedestrian signage is clearly posted and surface on temporary walk way smooth and with out obstacles.
4. CERTIFIED TRAFFIC CONTROLLERS: All signage & equipment as per this TCP are to be positioned by holder of a current traffic controller Yellow Card.
5. TCP No 4: Based on TCP 83 from the TCWS manual.
6. SCHEDULE OF WORKS: TBA by Robson Projects.
7. NOTE: When workers are not on site the worker symbolic signs will be removed or covered

GENERAL NOTES: This plan is to be read in conjunction with:
* TRAFFIC CONTROL AT WORKS SITES MANUAL 27-07-2018 - VERSION No 5
* None applicable existing signs to be covered.

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Certified by:
Red Card No:
Date: / /201 Sign:

Plan drawn by
Nigel Bolton

Phone
0412 444 156

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NIGEL BOLTON
Expiry Date: 12/01/2021
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NEWCASTLE SAND

APPENDIX 5. GROUNDWATER SUMMARY REPORT

Newcastle Sands

Baseline Water Quality Summary Report

Williamtown Sand Syndicate Pty Ltd.

Project No. 20193820.001A

Report Date: 27 March 2020

Newcastle Sands

Baseline Water Quality Summary Report

298 Cabbage Tree Road, Williamtown, NSW

Document Number: NCA20R107317
Project Number: 20193820.001A
Kleinfelder File Name: 20193820_WSS Baseline Summary Report v2.0 20200327

Prepared for:

WILLIAMTOWN SAND SYNDICATE PTY LTD.
PO Box 898
Newcastle NSW 2300

Only Williamtown Sand Syndicate Pty Ltd., its designated representatives or relevant statutory authorities may use this document and only for the specific project for which this report was prepared. It should not be otherwise referenced without permission.

Document Control:

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1.0	Draft for Client Review	24 March 2020	D. Kousbroek	B.Grant	T. Overton

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95 Mitchell Road
Cardiff NSW 2282
Phone: (02) 4949 5200

ABN: 23 146 082 500

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Contents

1. INTRODUCTION 1
   - 1.1 BACKGROUND 1
   - 1.2 PURPOSE OF THE BASELINE SUMMARY REPORT 1
   - 1.3 OBJECTIVES 2
   - 1.4 SCOPE OF WORK 2
2. SITE CHARACTERISTICS 3
   - 2.1 SITE IDENTIFICATION DETAILS 3
   - 2.2 CURRENT LAND USE 3
   - 2.3 FORMER LAND USE 3
   - 2.4 SURROUNDING LAND USE 4
   - 2.5 GEOLOGY 4
   - 2.6 HYDROLOGY & HYDROGEOLOGY 5
     - 2.6.1 Surface Water 5
     - 2.6.2 Groundwater 6
3. BACKGROUND MONITORING PROGRAM 7
   - 3.1 SAMPLING PLAN 7
   - 3.2 FIELD OBSERVATIONS 8
     - 3.2.1 General 8
     - 3.2.2 Monitoring Location Observations 8
     - 3.2.3 Geochemical parameters and gauging data 9
   - 3.3 GROUNDWATER AND SURFACE WATER ANALYSIS 10
     - 3.3.1 Industry guidelines 10
     - 3.3.2 Summary of results 11
4. BASELINE WATER QUALITY ASSESSMENT 17
   - 4.1 METALS 17
   - 4.2 PHYSICAL AND CHEMICAL STRESSORS 17
   - 4.3 TPH, TRH AND BTEXN 18
   - 4.4 PFAS 18
   - 4.5 TREND ANALYSIS 19
     - 4.5.1 Rainfall 19
     - 4.5.2 Groundwater Elevation 19
     - 4.5.3 Mann Kendall Analysis 19
5. SITE SPECIFIC ASSESSMENT CRITERIA 27

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5.1 SWMP & EMP REQUIREMENTS 27
5.2 EPL REQUIREMENTS 27
5.3 ANALYTICAL PARAMETERS 28
5.3.1 Metals 28
5.3.2 Nutrients 29
5.3.3 Hydrocarbons 29
5.3.4 PFAS 29
5.4 LOCATIONS 29
5.5 SCHEDULE 30
5.6 SUMMARY OF PROPOSED SAMPLING 30
5.7 SITE SPECIFIC TRIGGER VALUES 31
5.8 TRIGGER RESPONSE ACTIONS 39
5.8.1 Metals & Nutrients 39
5.8.2 Hydrocarbons 39
5.8.3 PFAS 40
5.8.4 Water Trigger Investigation 40

6. QUALITY ASSURANCE AND QUALITY CONTROL 41

6.1 DATA VALIDATION 41
6.2 QA/QC RESULTS 42
6.2.1 Field Method Validation 42
6.2.2 Laboratory QA/QC 43
6.3 QUALITY STATEMENT 46
6.4 EQUIPMENT CALIBRATION 46

7. SUMMARY STATEMENT 47

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Tables

Table 2.1 Site details 3
Table 3.1 2019-2020 Monitoring Schedule 7
Table 3.2 Monitoring locations: General observations 9
Table 3.3 Geochemical Parameters and Gauging Data (maximum and minimum values) 10
Table 3.4 Summary of groundwater and surface water concentration range 12
Table 4.1 Mann-Kendall analysis for metal 21
Table 4.2 Mann-Kendall analysis for anions, cations alkalinity and inorganics 23
Table 5.1 EPA Site water monitoring requirements (EPL21264) 27
Table 5.2 Proposed operational monitoring schedule 30
Table 5.3 Proposed testing schedule 31
Table 5.4 Site specific trigger values for Groundwater 32
Table 5.5 Site specific trigger values for Surface water 35
Table 6.1 QA/QC data quality indicators 41
Table 6.2 Field QA/QC 43
Table 6.3 Laboratory QA/QC 43
Table 6.4 Container types, preservation and order of filling 45
Table 6.5 Summary of groundwater QC program 46
Table 7.1 Proposed operational monitoring schedule 48
Table 7.2 Proposed testing schedule 49

Figures

Figure 1 Site location
Figure 2 Site layout including sample location
Figure 3 Proposed extraction areas

Tables

A Groundwater and surface water analytical data - BTEXN
B Groundwater and surface water analytical data - Metals
C Groundwater and surface water analytical data - PFAS
D Groundwater and surface water analytical data - Inorganics
E Quality control sample analysis - BTEXN
F Quality control sample analysis - Metals

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G Quality control sample analysis - PFAS

Charts

Chart 1: Monthly rainfall totals 2019/20 (mm)
Chart 2: Groundwater elevation (mAHD)
Chart 3: Field EC (µS/cm)
Chart 4: Iron (Fe) mg/L
Chart 5: Nickel (Ni) mg/L
Chart 6: Zinc (Zi) mg/L
Chart 7: Chromium (Cr) mg/L
Chart 8: Copper (Cu) mg/L
Chart 9: Manganese (Mn) mg/L
Chart 10: Total hardness ($CaCo_3$) mg/L
Chart 11: Total dissolved solids (TDS) mg/L
Chart 12: Sodium (Na) mg/L
Chart 13: Calcium (Ca) mg/L
Chart 14: Magnesium (Mg) mg/L
Chart 15: Potassium (K) mg/L
Chart 16: Sulphate ($SO4^{-2}$) mg/L
Chart 17: Chloride (Cl) mg/L
Chart 18: Fluoride (F^-) mg/L
Chart 19: pH (Lab)
Chart 20: pH (Field)

Appendices

Appendix A: Field Sheets and Calibration certificates
Appendix B: Monthly Reports

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1. INTRODUCTION

1.1 BACKGROUND

Kleinfelder Australia Pty Ltd (Kleinfelder) was engaged by Williamtown Sand Syndicate (WSS) to undertake a 12 month surface water and groundwater monitoring program to establish baseline conditions at the Newcastle Sands quarry site, 298 Cabbage Tree Road, Williamtown, New South Wales (NSW) (the 'Site'). The Site is located approximately 12 km north east of Newcastle at Williamtown, NSW. The location of the Site is depicted on **Figure 1** and the site layout is presented in **Figure 2**.

Monitoring was undertaken to satisfy the requirements of the Soil and Water Management Plan (SWMP) (KLF, 2019) and Environmental Protection Licence 21264 (EPL). It is noted that the SWMP is a sub-plan within the overarching 'Newcastle Sands Quarry Environmental Management Plan' (June 2018), referred to herein as the EMP.

Groundwater and surface water monitoring was conducted over 12 consecutive months from February 2019 through to January 2020 and was generally completed between the 11th and 18th of each month. A Sampling Plan was prepared and presented in the SWMP, covering an appropriate methodology and quality control requirements for the monitoring program (see **Section 3** for further details).

The Sampling Plan was designed to obtain representative background data on water flow and quality in surface water bodies and groundwater that has the potential to be impacted by the site operations, or unrelated off-site sources. The SWMP identifies that, unless amended, the ongoing surface water and groundwater monitoring program will be consistent with the baseline water quality program.

1.2 PURPOSE OF THE BASELINE SUMMARY REPORT

The SWMP identifies that on completion of the baseline monitoring program, the following parameters would be reviewed and advise ongoing monitoring requirements including:

- Location of sampling points, e.g. more suitable / representative location identified, or sampling location has insufficient water to accurately monitor development.
- The frequency of the sampling may be reduced, or increased, depending on the fluctuations in the results.
- The parameters may be adjusted to remove superfluous analytes and/or add additional analytes.

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1.3 OBJECTIVES

The objectives of the monitoring program were to:

- Establish background groundwater and surface water conditions across the Site;
- Establish site specific trigger values to be used during the operation of the quarry whereby concentrations outside these trigger values need to be reviewed in more detail; and
- Develop an ongoing sampling program (frequency and analysis) that will maintain compliance with the conditions of the EPL and EMP.

1.4 SCOPE OF WORK

The following provides the scope of work to deliver the baseline water quality summary report:

- Review and present site characteristic information;
- Provide an assessment of quality assurance (QA) and quality control (QC) undertaken over the 12-month period and validate the data;
- Provide a summary of the water quality identified across the site including:
  - Field observations;
  - Analytical results; and
  - Trend analysis;
- Establish trigger values for review against ongoing sampling; and
- Propose an ongoing monitoring programme to be conducted during operations that will maintain compliance with the EMP and EPL.

The scope of work for each of the background monitoring rounds can be seen in the monthly summary reports.

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2. SITE CHARACTERISTICS

2.1 SITE IDENTIFICATION DETAILS

Table 2.1 provides site-specific identification details.

Table 2.1 Site details

Site address	298 Cabbage Tree Road Williamtown, NSW.
Site name	Newcastle Sands Quarry.
Current Title identification details	Four titles within the Parish of Stockton, County of Gloucester including: • Lot 1 DP 224587 at 398 Cabbage Tree Road, Williamtown • Lot 121 DP 556403 at 282B Cabbage Tree Road, Williamtown. • Lot 11 DP 629503 at 282A Cabbage Tree Road, Williamtown. • Lot 1012 DP 814078 at 282 Cabbage Tree Road Williamtown
Current land use	Currently the Site comprises mostly native vegetation. Initial quarry works have progressed to include pre-works hardstand areas and administration buildings.
Site total area	Total Project Area of approximately 42.3 hectares from a Subject Land Area of approximately 176.2 hectares.
Current ownership	Port Stephens Shire Council under lease to Williamtown Sand Syndicate Pty Ltd.
Current land use zoning	The site is currently RU2 – Rural Landscape (Port Stephens LEP 2013).
Local government	Port Stephens Council.
Proposed site use	Sand quarry extracting up to 530,000 tonnes per annum over a period of 6 to 15 years including the construction of an intersection with Cabbage Tree Road, sealed and gravel access roads, site office, workshop and weighbridges. Progressive rehabilitation of quarried land returning to native vegetation communities with potential future use of the facilities area.

2.2 CURRENT LAND USE

The Site currently has a workshop, office area comprising of demountable buildings, gravel aggregate hardstand areas for transitioning vehicles and future sorting. The areas surrounding the immediate vicinity of the Site comprise predominantly natural vegetation with exception to a gravel road, two former silica sand extraction areas and the verge of Cabbage Tree Road.

2.3 FORMER LAND USE

The Project Area consists predominantly of native vegetation, with some previously cleared areas present in the eastern part of the site. Approximately 48 ha of the 176.2 ha site was previously disturbed by heavy mineral sand mining and associated activities that were undertaken on the site between 1970s and late 1990s. This disturbance included areas that were dredged as part of extracting heavy minerals, sand borrow pits, settling ponds, monazite trenches and access roads.

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In March 2002, Port Stephens Council (PSC) purchased four allotments comprising the project area (398, 282B, 282A and 282 Cabbage Tree Road Williamtown) from Rutile and Zircon Mines and was subsequently used for cattle adjustment. In 2012 PSC sought tenders from interested parties for the extraction of sand from the project area.

2.4 SURROUNDING LAND USE

The Williamtown RAAF base is located 2.5 km to the north east, with Fullerton Cove approximately 600 m to the south and the Hunter River estuary beyond (**Figure 1**).

Residential dwellings are located to the east (closest dwelling is 244 m), south (closest dwelling is 61 m) and west (closest dwelling is 83 m) of the Site. Most are small properties utilised as hobby farms (e.g. keeping horses and chickens), some are larger and also graze livestock. Potable water for dwellings is likely to comprise primarily reticulated water from Hunter Water network and rainwater. Many properties appear to have spear point wells installed for stock and domestic use. No dwellings are located within 4 km north of the Site.

2.5 GEOLOGY

Review of the Newcastle 1:250,000 series geological map (Sheet S1 56-2, 1966) indicates that the site is underlain by Quaternary aged marine and freshwater deposits comprising gravel, sand, silt, clay and “Waterloo Rock”.

The majority of the Site is located above the Tomago Sandbeds. The Tomago Sandbeds were formed during the Pleistocene era with the original sand deposits occurring up to 250,000 years ago. Rising sea levels created a large bay extending from Newcastle to Port Stephens. The Hunter and Karuah Rivers both flowed into the bay and deposited large volumes of sand. A combination of wave and wind action spread the sand along the coastline and formed the series of shallow dunes that make up the Tomago Sandbeds (Hunter water website 15/08/2018).

The sand dunes consist of a layer of highly permeable fine-grained sands underlain by impervious clay and rock. The thickness of the sand layer reaches a maximum of 50 metres, but on average is 20 metres deep (Hunter Water website 15/08/2018).

The North Stockton Sandbeds, which form the current coastline between Newcastle and Port Stephens, were deposited much more recently than the Tomago Sands. They overlie the eastern extremity of the Tomago Sands and were deposited in the Holocene era (10,000 years ago) (Hunter water website 15/08/2018).

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2.6 HYDROLOGY & HYDROGEOLOGY

2.6.1 Surface Water

The high permeability of the Tomago Sandbeds result in little or no defined surface runoff, noting no defined natural drainage lines are on the site. Drainage is therefore predominantly via vertical infiltration into the sand, with any ephemeral surface drainage generally expected to be in the direction of the existing surface slopes.

In the area around the Site, the Tomago Sandbeds are located on the edge of low lying (about 2-3 m AHD) Holocene aged freshwater and alluvial and estuarine swamps deposits. These low-lying areas adjoining the Site are frequently waterlogged during high rainfall, due to increasing and shallow groundwater levels and a shallow groundwater gradient that slows the percolation of surface water. It is likely that the majority of accessible surface water onsite is an expression of groundwater, typically created through man made excavation.

The western portion of the southern and norther resources areas theoretically drain to the west, while the dominant surface drainage direction for most of the Site is to the east (i.e. Catchments 2 and 3 above). Here the landform drops from the edge of the resource area around 5 m AHD to the swamp or flats over a relatively short distance with the gradient reaching up to 16%. The swamp areas have a gradient of approximately 0.1% with the elevation falling 1.5 m over the 1100 m to the eastern boundary of the Subject Land with water conveyed by an open constructed channel (in middle of Catchment 3).

From the eastern boundary of the Site, drainage is directed via constructed channels through to Dawsons Drain and the northern extent of Fullerton Cove where the elevation drops 1 m over 1900 m (with an average gradient of 0.05%).

For the south eastern portion of the Project area, a portion of the resource area has the potential to drain south east across the Subject Land to a culvert beneath Cabbage Tree Road (Catchment 4). In this area the landform drops at about 14% to the swamp or flats that then appears to have a very slight gradient to the south eastern corner of the site (i.e. less than 0.5 m over at least 140 m). From this point the area drains via series of constructed channels through to the Ring Drain, a large constructed channel around the northern extent of Fullerton Cove over a distance of 590 m with an average gradient of less than 0.4%. Inspection of the site shows this culvert is only likely to flow during periods of extended rainfall and a high-water table.

Cabbage Tree Road has been built up during its construction, with shallow table drains constructed partially along the northern side of the road and deeper drains constructed partially

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along the southern side. The nearest culvert is located at the eastern extent of the subject land, approximately 80 m beyond the proposed road construction area.

Following quarrying at the site the catchments will progressively change with Catchment 3 increasing in size with water from within the quarry footprint (currently draining west) directed south east into Catchment 3 (i.e. Catchment 1 will drain to Catchment 3). However, given the high permeabilities it is highly unlikely that any changes in flow would be realised across the site.

2.6.2 Groundwater

The Site is located on highly permeable Pleistocene Tomago Sandbeds (sand dunes). The source of the water within the Tomago Sandbeds is rainfall that lands directly on the sand surface. While a proportion of the rainfall is lost to plants and evaporation, sufficient water is stored in the sand to provide a viable and significant source of water for ongoing extraction. Over time rainfall landing on the sandbeds has washed out any remnants of sea salt leaving the deep sand system full of fresh water (Hunter Water website 15/08/2018).

A previous groundwater investigation was undertaken by RCA Australia (RCA Australia, 2015), groundwater was encountered on the Site ranging from 0.67 m below ground level (mbgl) to 15.65 mbgl. Groundwater when at its highest is visible at or near the surface for land below 3 m AHD. Groundwater at the Site has a low hydraulic gradient and was interpreted to flow in a general southerly to south-easterly direction, towards Fullerton Cove (RCA Australia, 2015) from Grahamstown Dam in the north toward Fullerton Cove in the south, the groundwater gradient within the local area is less than 0.2%.

The northern portion of the Site is located within the Hunter Water Special Area, owing to the presence of the Tomago Sandbeds and their use for a portion of the lower Hunter's drinking water supplies.

The Project area and extent of extraction has been designed such that sand extraction remains a minimum of 0.7 m above the highest predicted groundwater level, with the final landform to be established at no less than 1 m above the highest predicted groundwater level (about 2 m above the average level).

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3. BACKGROUND MONITORING PROGRAM

3.1 SAMPLING PLAN

The SWMP required monthly sampling to be undertaken over a 12-month period to characterise background groundwater and surface water conditions throughout the site.

10 groundwater (BH1, BH2, BH4, BH6, BH7, BH8, BH9, BH10, BH11 and MW239S) and 4 surface water (SW1, SW2, SW3 and SW4) locations were sampled throughout the 12 monitoring rounds as outlined in **Figure 2**. The remaining site wells (BH3, BH12, MW239D and BH5) were used to provide additional groundwater elevation data.

Each monitoring event included sampling for:

- General water quality parameters: (Calcium (Ca), Magnesium (Mg), Sodium (Na), Potassium (K), pH, Electrical Conductivity (EC), Chloride (Cl), Sulphate (SO_4), Alkalinity, Hardness & Total Dissolved Solids (TDS) (Calc')),
- Total Recoverable Hydrocarbons (TRH),
- Total Petroleum Hydrocarbons (TPH),
- Benzene, Toluene, Ethylbenzene, Total Xylenes, Naphthalene (BTEXN),
- Metals (Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn)); and
- PFAS including Perfluorooctane sulfonate (PFOS), Perfluorooctanoic acid (PFOA), Perfluorohexanesulfonate (PFHxS) & perfluorodecane sulfonic acid (PFDS).

The baseline sampling program also included an initial sampling round and quarterly monitoring where additional analysis was included for an extended water quality suite (including hardness, Nitrate, Nitrite, Ammonia, Reactive Phosphorous, Total Nitrogen and TKN). Some additional groundwater monitoring locations were also included in quarterly monitoring as identified in **Table 3.1.**

Table 3.1 2019-2020 Monitoring Schedule

Action	2019											2020
	Feb*	Mar	Apr	May*	Jun	Jul	Aug	Sep*	Oct	Nov*	Dec	Jan
Monthly Gauging and groundwater sampling BH1, BH2, BH4, BH6, BH7, BH8, BH9[1], BH10[1], BH11, MW239s	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Surface water sampling SW1, SW2[1], SW3, SW4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Action	2019											2020
	Feb*	Mar	Apr	May*	Jun	Jul	Aug	Sep*	Oct	Nov*	Dec	Jan
Gauging only BH3, BH5, BH12, MW239D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Groundwater Sampling BH3 & BH5	✓											

1: Sample locations were dry
* Shaded months indicate quarterly sampling suite

Following each monitoring round, a monthly factual letter report was prepared (see **Appendix A**). Each report presented:

- The field observations and field data;
- The results of the laboratory analysis;
- A comparison of the results against industry guidelines; and
- Rainfall data from the preceding month.

3.2 FIELD OBSERVATIONS

3.2.1 General

Surface water and groundwater monitoring was initiated in February 2019 and continued each month for a duration of 12 months until January 2020. Sampling times were generally consistent, undertaken each time within the middle of the month (between the 11th and 18th of the month). Within the first two monitoring rounds (February and March) re-insertion of PVC piping was required at fire effected location BH1 and for root bound effected location BH12. Site works, focussing on initial site infrastructure and access roads, began in October 2019 in preparation for the proposed quarry extraction works which are expected to initiate from early to mid 2020.

3.2.2 Monitoring Location Observations

Groundwater and surface water observations made during gauging and sampling at monitoring locations BH1, BH2, BH3 BH4, BH6, BH7, BH8, BH9, BH10, BH11, MW239S, SW1, SW2, SW3 and SW4 are summarised below. Conditions at each location were generally consistent throughout the monitoring period with the exception of surface water which provided intermittent periods of accessible water throughout the monitoring program.

Sensory observations of visual and olfactory quality were made on groundwater and surface water during sampling. A summary of these observations is presented in **Table 3.2** below.

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Table 3.2 Monitoring locations: General observations

Location	General Observations
BH1	Generally, slightly cloudy brown with occasional sulfur odour. Well was reinstated in February 2019 following fire damage. The month following reinstatement an acrylic odour was detected which was most likely a bonding material used to fuse the PVC well piping together.
BH2[1]	Mostly dark brown in colour with a silty material at the base of well. A slight sulfur odour was evident throughout the monitoring period.
BH3	Prior to well decommissioning in September 2019 due to initial site works, observations of groundwater were identified as light brown with no odour. Well base contained fine silty material. No samples were taken following initial sampling round in February 2019.
BH4[1]	Generally light brown in colour with slight sulfur odour.
BH5	Generally light brown with no apparent odour. No samples taken throughout the monitoring program, only gauging.
BH6[2]	Generally, light brown in colour with a slight sulfur odour.
BH7[1]	Generally, light to moderately brown in colour with a slight sulfur odour.
BH8	Generally, brown to dark brown in colour with a moderate sulfur odour.
BH9[1]	Well was dry for the duration of the baseline monitoring program.
BH10	Well was dry for the duration of the baseline monitoring program.
BH11[2]	Generally, cloudy light brown with a moderate sulfur odour.
BH12	Well was reinstated in March 2019 following inundation of roots into the well. A 40mm inner PVC pipe was installed. The months following reinstatement of a well an acrylic odour was detected which was most likely a bonding material used to fuse the PVC well piping together. No sample was taken.
MW239S[1]	Cloudy dark brown in colour with a moderate sulfur odour.
MW239D	Cloudy dark brown in colour with a moderate sulfur odour. No sample was taken.
SW01	Intermittent periods of pooling at monitoring location. Water is generally stained with natural tannins, dark brown with a slight sulfur odour.
SW02	Monitoring location was observed to be dry for the duration of the baseline monitoring program.
SW03	Water mostly clear with no apparent odour. Often water was stagnant and at times dry.
SW04	Water mostly clear with no apparent odour. Often water was stagnant and at times dry.

1 – Down gradient monitoring location
2 – Upgradient control location

3.2.3 Geochemical parameters and gauging data

Geochemical parameters and gauging data were recorded during the sampling program and are presented on field sheets in **Appendix A** and summarised as a maximum and minimum values in **Table 3.3.**

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Table 3.3 Geochemical Parameters and Gauging Data (maximum and minimum values)

Monitoring Location	Depth to Water (mBTOC) (Chart 1)		Temp (°C)		EC (µs/cm) (Chart 3)		pH (Chart 20)		Redox (mV)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Groundwater										
BH1	5.776	6.701	18.4	22.52	18	182	5.39	6.43	15.2	103
BH2	5.083	6.153	18.3	24.49	48	136	4.29	6.41	88	308
BH3[1]	5.938	6.146	22.1		82.4		4.54		94	
BH4	1.531	2.252	17.6	23.3	8	129.2	3.85	6.49	88	322
BH5[2]	5.767	6.315	20.1		320		4.06		122	
BH6	1.591	2.169	17.2	24.62	110	335	4.28	5.52	-144	178
BH7	1.514	2.169	17.2	25	164	391	4.04	5.93	-228	179
BH8	2.233	2.969	16.8	22.5	224	995	4.08	7.43	-341	176
BH9	Dry		-		-		-		-	
BH10	Dry		-		-		-		-	
BH11	3.02	3.962	16.9	22.65	124	402	3.78	6.41	-117	176
BH12[3]	6.799	7.252	-		-		-		-	
MW239S	1.248	1.823	15.8	24.71	37	718	4.09	5.7	-132	179
MW239D[3]	1.226	1.799	-		-		-		-	
Surface Water										
SW1	Dry	0.290mm[4]	9.52	23.75	811	1964	3.95	6.4	99	406
SW2	Dry[3,4]		-		-		-		-	
SW3	Dry	0.290mm[4]	11.96	26	290	470	4.27	6.41	-12.8	315
SW4	Dry	0.350mm[4]	8.07	18.46	313	538	3.69	6.44	116	430.5

1 – One sampling event (Feb 2019) and well decommissioned September 2019
2 – One sampling event (Feb 2019)
3 – No sampling undertaken
4 - Surface water levels (mm) identified from measured stake at each location (When dry number is ground elevation AHD)

3.3 GROUNDWATER AND SURFACE WATER ANALYSIS

3.3.1 Industry guidelines

In order to understand background surface and groundwater quality in relation to published data, laboratory results were compared against trigger values found in industry guidelines as outlined in the SWMP.

An exceedance of any adopted trigger value does not necessarily indicate that there is an unacceptable risk on site (CRC-CARE Technical Report 10: 2011), but rather identifies the need to explore the results in more detail. For this report we are reviewing natural background conditions and this comparison identifies the quality of the natural conditions indicative of this area.

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The following industry guidelines have been used:

- Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), Water Quality Guidelines for Fresh and Marine Water Quality 95% species protection for fresh water (ANZECC 2000);
- The Heads of Environmental Protection Authorities in Australia and New Zealand (HEPA) Per- and polyfluoroalkyl substances (PFAS) National Environmental Management Plan (NEMP 2018); and
- Australian Drinking Water Guidelines 6 (ADWG) (2011).

3.3.2 Summary of results

Summary tables outlining the analytical data obtained from the Baseline Monitoring Program, and a comparison against trigger values are provided within the **Tables** section at the rear of this report. **Table 3.4** below provides a summary of groundwater and surface water concentrations as a range (minimum to maximum) for all analytes across the Site.

An assessment of Kleinfelder's Quality Assurance and Quality Control (QA/QC) processes and procedures has been provided in **Section 6**. Laboratory Certificates of Analysis (COA) including laboratory QC reports are presented as Appendix A of the monthly reports, which have been provided as **Appendix B** of this document**.**

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Table 3.4 Summary of groundwater and surface water concentration range

Analyte	Units	LOR	ANZECC (2000) 95% level of species protection freshwater	ADWG (2011)	Detected Concentration Range (Groundwater)	Detected Concentration Range (Surface Water)	Comparison against trigger values
BETXN (Table A)							
Benzene	µg/L	1	950	1	<1.0	<1.0	Below LOR
Toluene	µg/L	2	-	800	<2.0	<2.0	Below LOR
Ethylbenzene	µg/L	2	-	300	<2.0	<2.0	Below LOR
o Xylene	µg/L	2	350	350	<2.0	<2.0	Below LOR
Total Xylenes	µg/L	2	-	600	<2.0	<2.0	Below LOR
Naphthalene	µg/L	5	16	-	<5.0	<5.0	Below LOR
Total Petroleum Hydrocarbons – Silica Gel Clean up (Table A)							
Sum of C_{10}-C_{36}	µg/L	50	-	-	<50-250	<50	No criteria
Total Recoverable Hydrocarbons – Silica Gel Clean up (Table A)							
Sum of C_{10}-C_{40}	µg/L	100	-	-	<100-280	<100	No criteria
Dissolved Metals (Table B)							
Arsenic	mg/L	0.001	0.013	0.01	<0.001-0.003	<0.001-0.006	Concentrations below trigger values
Barium	mg/L	0.001	-	-	0.001-0.034	0.027-0.08	No criteria
Beryllium	mg/L	0.001	-	0.06	<0.001	<0.001	Below LOR
Boron	mg/L	0.05	0.37	4	<0.05-0.06	<0.05-0.14	Concentrations below trigger values
Cadmium	mg/L	0.0001	0.0002	0.002	<0.0001	<0.0001-0.0002	Concentrations below trigger values
Chromium	mg/L	0.001	0.001	0.05	<0.001-0.004	<0.001-0.002	Elevated concentrations above trigger values (ANZECC 2000 trigger values) were detected at BH1 (entire monitoring period), BH2 (Dec 2019), BH3 (Feb 2019), BH7 (Feb, April, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec 2019 & Jan 2020), BH8 (Sep, Nov, Dec 2019 & Jan 2020),

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Analyte	Units	LOR	ANZECC (2000) 95% level of species protection freshwater	ADWG (2011)	Detected Concentration Range (Groundwater)	Detected Concentration Range (Surface Water)	Comparison against trigger values
							BH11 (Feb, Apr, May, Jul, Aug, Oct, Nov, Dec 2019 & Jan 2020), MW239S (entire monitoring period) and SW3 (Dec 2019)
Cobalt	mg/L	0.001	-	-	<0.001-0.003	<0.001-0.017	No criteria
Copper	mg/L	0.001	0.0014	2	<0.001-0.051	<0.001-0.02	Elevated concentrations above trigger values (ANZECC 2000 trigger values) were detected at BH1 (Apr, Jul, Aug, Oct 2019 & Jan 2020), BH2 (Feb, Mar, Apr, Jun, Jul, Aug, Sep, Oct, Nov, Dec 2019 & Jan 2020), BH4 (Feb, Apr, Jun, Jul, Aug, Sep, Oct, Nov, Dec 2019 & Jan 2020), BH6 (Aug, Sep & Dec 2019), BH7 (Oct & Nov 2019), BH8 (Oct, Nov & Dec 2019), SW1 (Apr, May, Jun, Jul, Aug, Sep & Oct 2019), SW3 (Jul, Aug, Sep, Oct & Dec 2019), SW4 (Apr, Jun, Jul, Sep & Oct 2019)
Iron	mg/L	0.05	-	0.32	<0.05-12.5	0.57-9.26	Elevated concentrations above trigger values (ADWG) were detected at BH1 (entire monitoring period), BH2 (Oct 2019 & Jan 2020), BH4 (Apr & Oct 2019), BH5 (Feb 2019), BH6 (entire monitoring period), BH7 (entire monitoring period), BH8 (entire monitoring period), BH11 (Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec 2019 & Jan 2020), MW239S (entire sampling period), SW1 (entire monitoring period), SW3 (entire monitoring period), SW4 (entire monitoring period)
Lead	mg/L	0.001	0.0034	0.01	<0.001-0.001	<0.001-0.001	Concentrations below trigger values
Manganese	mg/L	0.001	1.9	0.5	0.003-0.136	0.026-0.841	Elevated concentrations above trigger values (ADWG) were detected at SW1 (Apr, May, Jun, Jul and Sep 2019)
Mercury	mg/L	0.0001	0.0006	0.001	<0.0001	<0.0001	Concentrations below initial baseline criteria
Nickel	mg/L	0.001	0.011	0.02	<0.001-0.07	<0.001-0.02	Elevated concentrations above trigger values (ANZECC trigger values) were detected at BH2 (Feb 2019), BH4 (Feb 2019), BH7 (Sep & Nov 2019), BH8 (Nov 2019), SW1 (Apr, May & Sep 2019) and SW4 (Sep 2019). Elevated concentrations above trigger values (ADWG trigger values) were detected at BH3 (Feb 2019) and BH4 (Mar & May 2019)
Selenium	mg/L	0.01	0.011	0.01	<0.01	<0.01	Below LOR

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Analyte	Units	LOR	ANZECC (2000) 95% level of species protection freshwater	ADWG (2011)	Detected Concentration Range (Groundwater)	Detected Concentration Range (Surface Water)	Comparison against trigger values
Vanadium	mg/L	0.01	-	-	<0.01	<0.01	Below LOR
Zinc	mg/L	0.005	0.008	32	<0.005-1.27	<0.005-0.535	Elevated concentrations above initial trigger values (ANZECC 2000 trigger values) were detected at BH1 (entire monitoring period), BH2 (Nov 2019 & Jan 2020), BH4 (Feb, Mar, May, Oct 2019 & Jan 2020), BH6 (Feb, Mar, Apr, Sep & Nov 2019), BH7 (Feb, Mar, Apr, May, Sep, Oct & Nov 2019), BH8 (Oct, Nov 2019 & Jan 2020), BH11 (Feb, Mar, Apr, May, Sep & Oct 2019), MW239S (Sep, Oct & Nov 2019), SW1 (entire monitoring period), SW3 (Feb, Mar, Apr, May, Jun, Jul, Aug, Sep & Oct 2019), SW4 (Apr, May, Jun, Jul, Aug, Sep & Oct 2019)
PFAS (Table C)							
PFOS	µg/L	0.01	0.00023[3]	-	<0.01	<0.01-0.05	Concentrations reported above LOR at SW4 (16 Sep & 25 Sep 2019).
PFOA	µg/L	0.02	19[3] 5.6[4]	0.56	<0.02-0.02	<0.02	Concentrations below trigger values
PFOS/PFHxS	µg/L	0.01	0.7[4]	0.07	<0.01	<0.01-0.05	Concentrations below trigger values
PFDS	µg/L		-	-	<0.02-0.02	<0.02	Concentrations below trigger values
Physical and Chemical Stressors (Table D)							
pH	pH units	0.01	6.5-8.0[1]-	6.5-8.5[2]	4.37-6.29	4.0-6.21	pH values across the entire site for both surface water and groundwater were below ANZECC 2000 and ADWG acceptable range
Sodium	mg/L	1	-	180[2]	6.0-67	32-142	Concentrations below trigger values
Calcium	mg/L	1	-	-	<1.0-3.0	4.0-34	Concentrations below trigger values
Magnesium	mg/L	1	-	-	<1.0-10	4.0-52	Concentrations below trigger values
Potassium	mg/L	1	-	-	<1.0-2.0	<1.0-6.0	Concentrations below trigger values
Sulphate	mg/L	1	-	250[2]	2.0-70	16-324	Elevated concentrations above trigger values (ADWG aesthetic) detected in April and May 2019 at SW1
Chloride	mg/L	1	-	250[2]	16-127	53-234	Concentrations below trigger values
Fluoride	mg/L	0.1	-	1.5	<0.1-0.2	<0.1-0.7	Concentrations below trigger values

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Analyte	Units	LOR	ANZECC (2000) 95% level of species protection freshwater	ADWG (2011)	Detected Concentration Range (Groundwater)	Detected Concentration Range (Surface Water)	Comparison against trigger values
Reactive phosphorus as P	mg/L	0.01	0.02[1]	-	<0.01-0.03	<0.01-0.01	Elevated concentrations above trigger values (ANZECC 2000 default trigger values) detected at BH1 in May 2019
Total Phosphorus	mg/L	0.01	0.05[1]	-	<0.01-2.76	<0.01-0.13	Elevated concentrations above trigger values (ANZECC 2000) trigger values were detected at BH1 (Sep 2019), BH2 (Feb, Sept & Nov 2019), BH3 (Feb 2019), BH4 (Feb, May, Sept, Nov 2019), BH 5 (Feb 2019), BH6 (May, Sep & Nov 2019), BH7 (Feb, May & Sep 2019), BH8 (Feb, Sep & Nov 2019), BH11 (Sep & Nov 2019), MW239S (Feb, May, Sep & Nov 2019), SW1 (May 2019) and SW3 (Feb 2019).
Ammonia as N	mg/L	0.01	0.9	0.5[2]	<0.01-0.34	<0.01-0.16	Concentrations below trigger values
Total Nitrogen as N	mg/L	0.01	0.35[1]	-	0.03-5.9	0.1-1.8	Elevated concentrations above trigger values (ANZECC 2000 trigger values) were detected at BH2 (Feb, May, Oct & Nov 2019), BH3 (Feb 2019), BH4 (Feb, May & Oct 2019), BH5 (Feb 2019), BH6 (Feb, May, Sep and Nov 2019), BH7 (Feb, May, Sep & Nov 2019), BH8 (Feb, May, Sep & Nov 2019), BH11 (Feb, May, Sep & Nov 2019), MW239S (Feb, May, Sep & Nov 2019), SW1 (May, Sep & Nov 2019) and SW3 (Feb & Nov 2019).
Total Cations	meq/L	0.01	-	-	0.39-3.57	2.23-10	No criteria
Total Anions	meq/L	0.01	-	-	0.54-6.61	2.18-11	No criteria
Total Alkalinity as CaCO3	mg/L	1	-	-	<1.0-24	<1.0-11	No criteria
Total Hardness as CaCO3	mg/L	1	-	200[2]	5.0-41	26-299	Elevated concentrations above trigger values (ADWG aesthetic) were detected at SW1 (Apr, May & Sep 2019).
Electrical Conductivity @ 25°C*	mg/L	1	125-2200	-	54-439	220-1090	Concentrations below trigger values

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Analyte	Units	LOR	ANZECC (2000) 95% level of species protection freshwater	ADWG (2011)	Detected Concentration Range (Groundwater)	Detected Concentration Range (Surface Water)	Comparison against trigger values
Total Dissolved Solids	mg/L	1	-	600[2]	35-285	143-708	Elevated concentrations above trigger values (ADWG aesthetic) were detected at SW1 (May, Sep, Oct & Nov 2019).

1 – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
2 – Aesthetic
3 – HEPA NEMP 2018 99% level of protection in freshwater
4 – HEPA NEMP 2018 Recreation Water

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4. BASELINE WATER QUALITY ASSESSMENT

4.1 METALS

Elevated concentrations of chromium above trigger values (ANZECC 2000) were recorded at monitoring locations BH1, BH2, BH3, BH7, BH8, BH11, MW239S and SW3. Concentrations ranged from <0.001mg/L - 0.004 mg/L for groundwater and from <0.001 – 0.002 mg/L for surface water.

Elevated concentrations of copper above trigger values (ANZECC 2000) were recorded at monitoring locations BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 and SW4. Concentrations ranged from <0.001mg/L - 0.051 mg/L for groundwater and from <0.001 mg/L – 0.02 mg/L for surface water.

Elevated concentrations of iron above trigger values (ADWG) were recorded at all monitoring locations. Concentrations ranged from <0.05 mg/L – 12.5 mg/L for groundwater and from 0.57mg/L– 9.26 mg/L for surface water. Iron concentrations were particularly higher at location BH1.

Elevated concentrations of manganese above trigger values (ADWG) were recorded at monitoring location SW1. Concentrations ranged from <0.003 mg/L – 0.136 mg/L for groundwater and from 0.026 mg/L– 0.841 mg/L for surface water.

Elevated concentrations of nickel above trigger values (ANZECC 2000) were recorded at monitoring locations BH2, BH4, BH7, BH8, SW1, SW3 & SW4. Elevated concentrations of nickel above trigger values (ADWG) were recorded at monitoring locations BH3, BH4 and BH11. Concentrations ranged from <0.001 mg/L – 0.07 mg/L for groundwater and from <0.001mg/L– 0.02 mg/L for surface water.

Elevated concentrations of zinc above trigger values (ANZECC 2000) were recorded at monitoring locations BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 and SW4. Concentrations ranged from <0.005 mg/L – 1.27 mg/L for groundwater and from <0.005 mg/L – 0.535 mg/L for surface water.

4.2 PHYSICAL AND CHEMICAL STRESSORS

Elevated concentrations of sulphate above trigger values (ADWG aesthetic) were recorded at monitoring location SW1. Concentrations ranged from 2.0 mg/L – 7.0 mg/L for groundwater and from 16 mg/L – 324 mg/L for surface water.

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An elevated concentration of reactive phosphorus above trigger values (ANZECC 2000) default trigger values was recorded at BH1. Concentrations ranged from<0.01 – 0.03 mg/L for groundwater and <0.01-0.13 mg/L for surface water.

Elevated concentrations of total phosphorus above trigger values (ANZECC 2000) were recorded at monitoring locations BH1 and BH2. Concentrations ranged from <0.01 mg/L – 2.11 mg/L for groundwater and from 0.01 mg/L – 0.13 mg/L for surface water.

Elevated concentrations of total nitrogen above trigger values (ANZECC 2000) were recorded at monitoring locations B2, BH3, BH4, BH5, BH6, BH7 BH8, BH11, MW239S, SW1 and SW3. Concentrations ranged from <0.01 mg/L – 2.11 mg/L for groundwater and from 0.01 mg/L – 0.13 mg/L for surface water

Elevated concentrations of Total Hardness as $CaCO_3$ above trigger values (ADWG aesthetic) were recorded at monitoring location SW1. Concentrations ranged from 5.0 mg/L – 41 mg/L for groundwater and from 26 mg/L – 299 mg/L for surface water.

Elevated concentrations of Total Dissolved Solids above trigger values (ADWG aesthetic) were recorded at monitoring location SW1. Concentrations ranged from 35 mg/L – 285 mg/L for groundwater and from 143 mg/L – 708 mg/L for surface water.

Concentrations of pH were below/outside the trigger value range at all monitoring locations. Concentrations ranged from 4.37– 6.29 for groundwater and from 4.0– 6.21 for surface water.

4.3 TPH, TRH AND BTEXN

No hydrocarbon exceedances above adopted criteria were recorded throughout the 12-month monitoring program. Detections were recorded at locations BH1 and BH4. Detections of hydrocarbons at BH1 can be attributed to an acrylic adhesive used for the reinstatement of the above ground section of the well. Detections of hydrocarbons at BH4 followed in close succession with rainfall recorded in the region. BH4 is located adjacent to Cabbage Tree Road and detected concentrations may be attributed to roadway runoff.

4.4 PFAS

One detection of PFOS above adopted aquatic criteria (LOR) protection was recorded at SW4 (0.03 µg/L) and subsequently identified again (0.05 µg/L) during follow-up sampling one week later. Further detections above LOR were identified at BH4 (PFDS -0.02 µg/L) and BH6 (6:2 FTS – 0.19 µg/L). Detections of PFAS at SW4 followed on from recent rainfall in the area which may have contributed to groundwater migration from surrounding known sources (i.e.

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Williamtown RAAF Base). Kleinfelder would expect local groundwater to exceed the aquatic criteria given the scale of PFAS reported in groundwater within the Red Zone.

4.5 TREND ANALYSIS

A description of the trends observed throughout the 12-month monitoring period are provided in the sections below and graphical representations are located in the **Chart** section at the rear of this report.

4.5.1 Rainfall

Rainfall for the site was generally well below the mean average (1942-present) for the locality (BOM Williamtown RAAF 61078) over the 12-month monitoring period. Rainfall exceedances above the mean were recorded in March, June, August and September 2019 with the remainder of months experiencing significantly lower rainfall than would normally be expected. The total rainfall recorded over the 12-month monitoring program was 731.8mm which is 486.4mm less than the yearly mean total of 1218.2mm. **Chart 1** provides a graphical representation of rainfall totals for each month.

4.5.2 Groundwater Elevation

Groundwater throughout the sampling locations demonstrated a general decline in elevations throughout the 12-month period. Most notably the greatest decline in groundwater elevations was observed in the months following the November 2019 water monitoring event which correlate directly with a significant decrease in rainfall from the mean average and increase in temperatures. **Chart 2** provides a graphical representation of groundwater elevation identified following gauging throughout the 12-month monitoring period.

4.5.3 Mann Kendall Analysis

Where sufficient data is available, statistical trend analysis using the Mann-Kendall Trend Test has been undertaken for selected analytes at EPL and SWMP monitoring points to determine if obvious trends were apparent in the dataset (**Table 4.1** and **Table 4.2**). The purpose of the Mann-Kendall Test (Mann 1945, Kendall 1975, Gilbert 1987) is to statistically assess if there is a monotonic upward or downward trend of the variable of interest over time. A monotonic upward (downward) trend means that the variable consistently increases (decreases) through time, but the trend may or may not be linear.

MKA relies on three statistical metrics including:

- **The 'S' Statistic**: Indicates whether concentration trend vs. time is generally decreasing (negative S value) or increasing (positive S value).

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- **The Confidence Factor (CF):** The CF value modifies the S Statistic calculation to indicate the degree of confidence in the trend result, as in 'Decreasing" vs. "Probably Decreasing" or "Increasing" vs. "Probably Increasing." Additionally, if the confidence factor is quite low, due either to considerable variability in concentrations vs. time or little change in concentrations vs. time, the CF is used to apply a preliminary "No Trend" classification, pending consideration of the COV.
- **The Coefficient of Variation (COV):** The COV is used to distinguish between a "No Trend" result (significant scatter in concentration trend vs. time) and a "Stable" result (limited variability in concentration vs. time) for datasets with no significant increasing or decreasing trend (e.g. low CF).

Where an analyte has recorded a non-detect following laboratory analysis half of the value of detection (LOR) has been applied.

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Table 4.1 Mann-Kendall analysis for metal

Site ID	Mann-Kendall Analysis	Metals						
		Barium	Chromium	Copper	Iron	Manganese	Nickel	Zinc
BH1	Coefficient of Variation	0.47	0.24	0.93	0.31	0.25	0.67	1.91
	Mann-Kendall Statistic (S)	-3	-12	11	-15	-16	-2	-33
	Confidence Factor	56.0%	79.9%	77.7%	85.9%	87.5%	53.0%	99.5%
	Concentration Trend	Stable	Stable	No Trend	Stable	Stable	Stable	Decreasing
BH2	Coefficient of Variation	0.20	0.69	0.62	1.05	0.27	1.77	1.15
	Mann-Kendall Statistic (S)	-9	9	29	16	-26	-8	24
	Confidence Factor	70.4%	70.4%	97.4%	87.5	95.7%	68.1%	94.2%
	Concentration Trend	Stable	No Trend	Increasing	No Trend	Decreasing	No Trend	Prob. Increasing
BH4	Coefficient of Variation	0.10	0.27	1.15	0.90	1.11	1.38	1.02
	Mann-Kendall Statistic (S)	-26	9	13	2	-16	-31	-25
	Confidence Factor	95.7%	70.4%	79.0%	59.2%	84.5%	98.1%	95.0%
	Concentration Trend	Decreasing	No Trend	No Trend	No Trend	No Trend	Decreasing	Prob. Decreasing
BH6	Coefficient of Variation	0.09	0.27	1.37	0.29	0.20	1.54	1.27
	Mann-Kendall Statistic (S)	-6	9	10	-2	-19	9	-12
	Confidence Factor	63.1%	70.4%	72.7%	52.7%	88.9%	70.4%	77.0%
	Concentration Trend	Stable	No Trend	No Trend	Stable	Stable	No Trend	No Trend
BH7	Coefficient of Variation	0.45	0.15	1.56	0.28	0.38	0.92	1.37
	Mann-Kendall Statistic (S)	18	9	7	-49	-43	-14	-6
	Confidence Factor	87.5%	70.4%	65.6%	>99.9%	99.9%	81.0%	63.1%
	Concentration Trend	No Trend	No Trend	No Trend	Decreasing	Decreasing	Stable	No Trend
BH8	Coefficient of Variation	0.23	0.37	0.90	0.24	0.36	1.10	1.70
	Mann-Kendall Statistic (S)	-8	30	23	-26	9	2	20
	Confidence Factor	68.1%	97.8%	93.3%	95.7%	70.4%	52.7%	90.2%

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Site ID	Mann-Kendall Analysis	Metals						
		Barium	Chromium	Copper	Iron	Manganese	Nickel	Zinc
	Concentration Trend	Stable	Increasing	Prob. Increasing	Decreasing	No Trend	No Trend	Prob. Increasing
BH11	Coefficient of Variation	0.35	0.26	1.10	0.35	0.28	1.9	0.87
	Mann-Kendall Statistic (S)	-24	9	16	7	23	-28	-32
	Confidence Factor	94.2%	70.4%	84.5%	65.6%	93.3%	96.9%	98.4%
	Concentration Trend	Prob. Decreasing	No Trend	No Trend	No Trend	Prob. Increasing	Decreasing	Decreasing
MW239S	Coefficient of Variation	0.25	0.14	0.41	0.20	0.24	0.78	1.10
	Mann-Kendall Statistic (S)	11	9	-1	5	6	5	5
	Confidence Factor	74.9%	70.4%	50.0%	60.6	63.1%	60.6%	60.6%
	Concentration Trend	No Trend	No Trend	Stable	No Trend	No Trend	No Trend	No Trend
SW1	Coefficient of Variation	0.27	0.37	0.77	0.67	0.27	0.858	0.88
	Mann-Kendall Statistic (S)	5	10	7	-20	-26	-19	-16
	Confidence Factor	68.3%	86.2%	80.9%	99.3%	100.0%	98.9	96.9%
	Concentration Trend	No Trend	No Trend	No Trend	Decreasing	Decreasing	Decreasing	Decreasing
SW3	Coefficient of Variation	0.37	0.64	1.48	0.95	0.21	1.07	1.20
	Mann-Kendall Statistic (S)	-23	18	8	-25	-34	-9	-3
	Confidence Factor	95.7%	90.5%	89.8%	97.0%	99.6%	83.2%	56.0%
	Concentration Trend	Decreasing	Prob. Increasing	No Trend	Decreasing	Decreasing	No Trend	No Trend
SW4	Coefficient of Variation	0.17	0.00	1.3	1.18	0.13	1.06	1.08
	Mann-Kendall Statistic (S)	-20	0	2.0	-8	-3	-9	-11
	Confidence Factor	99.3%	45.2%	57.0%	80.1%	59.4%	83.2%	88.7%
	Concentration Trend	Decreasing	Stable	No Trend	No Trend	Stable	No Trend	No Trend

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Table 4.2 Mann-Kendall analysis for anions, cations alkalinity and inorganics

Site ID	Mann-Kendall Analysis	Anions and Cations					Alkalinity		Inorganics		
		Sodium	Calcium	Magnesium	Sulphate	Chloride	Total Alkalinity as CaCO3	Total Hardness as CaCO3	EC	TDS	pH
BH1	Coefficient of Variation	0.14	0.68	0.22	0.46	0.08	0.48	0.16	0.12	0.12	0.05
	Mann-Kendall Statistic (S)	24	-19	19	3	-17	22	-5	14	14	11
	Confidence Factor	96.4%	91.8%	91.8%	56.0%	89.1%	94.9%	61.9%	84.0%	84.0%	77.7%
	Concentration Trend	Increasing	Prob. Decreasing	Prob. Increasing	No Trend	Stable	Prob. Increasing	Stable	No Trend	No Trend	No Trend
BH2	Coefficient of Variation	0.10	0.27	0.15	0.54	0.11	1.48	0.13	0.11	0.29	0.06
	Mann-Kendall Statistic (S)	17	-5	-7	-2	-46	21	-13	30	10	34
	Confidence Factor	86.0%	60.6%	65.6%	52.7%	100.0%	91.3%	79.0%	97.8%	72.7%	99.0%
	Concentration Trend	No Trend	Stable	Stable	Stable	Decreasing	Prob. Increasing	Stable	Increasing	No Trend	Increasing
BH4	Coefficient of Variation	0.19	0.30	0.41	0.75	0.06	1.27	0.30	0.14	0.27	0.05
	Mann-Kendall Statistic (S)	28	-18	19	14	-9	8	5	33	16	4
	Confidence Factor	96.9%	87.5%	89.9%	81.0%	70.4%	68.1%	60.6%	98.7%	84.5%	58.0%
	Concentration Trend	Increasing	Stable	No Trend	No Trend	Stable	No Trend	No Trend	Increasing	No Trend	No Trend
BH6	Coefficient of Variation	0.11	0.21	0.12	0.21	0.10	1.29	0.10	0.12	0.13	0.07
	Mann-Kendall Statistic (S)	23	-2	-11	-19	16	19	-15	42	27	36
	Confidence Factor	93.3%	52.7%	74.9%	88.9%	84.5	88.9%	82.8%	99.8%	96.3%	99.3%
	Concentration Trend	Prob. Increasing	Stable	Stable	Stable	No Trend	No Trend	Stable	Increasing	Increasing	Increasing
BH7	Coefficient of Variation	0.12	0.00	0.15	0.14	0.14	1.31	0.16	0.10	0.13	0.05
	Mann-Kendall Statistic (S)	-36	0	-20	-4	-35	20	-20	-8	-21	42
	Confidence Factor	99.3%	47.3%	90.2%	58.0%	99.2%	90.2%	90.2%	68.1%	91.3%	99.8%

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Site ID	Mann-Kendall Analysis	Anions and Cations					Alkalinity		Inorganics		
		Sodium	Calcium	Magnesium	Sulphate	Chloride	Total Alkalinity as CaCO3	Total Hardness as CaCO3	EC	TDS	pH
	Concentration Trend	Decreasing	Stable	Prob. Decreasing	Stable	Decreasing	Prob. Increasing	Prob. Decreasing	Stable	Prob. Decreasing	Increasing
BH8	Coefficient of Variation	0.08	0.00	0.27	1.49	0.18	1.55	0.29	0.09	0.12	0.05
	Mann-Kendall Statistic (S)	-1	0	-29	2	-18	18	-29	4	2	51
	Confidence Factor	50.0%	47.3%	97.4%	52.7%	87.5%	87.5%	97.4%%	58.0%	52.7%	>99.9%
	Concentration Trend	Stable	Stable	Decreasing	No Trend	Stable	No Trend	Decreasing	No Trend	No Trend	Increasing
BH11	Coefficient of Variation	0.27	0.00	0.56	1.52	0.20	0.78	0.58	0.28	0.36	0.03
	Mann-Kendall Statistic (S)	-26	0	-14	-23	-34	20	-14	-4	-5	28
	Confidence Factor	95.7%	47.3%	81.0%	93.3%	99.0%	90.2%	81.0%	58.0%	60.6%	96.9%
	Concentration Trend	Decreasing	Stable	Stable	Prob. Decreasing	Decreasing	Prob. Increasing	Stable	Stable	Stable	Increasing
MW239S	Coefficient of Variation	0.10	0.00	0.12	0.43	0.18	1.33	0.12	0.12	0.12	0.04
	Mann-Kendall Statistic (S)	22	0	19	-3	11	7	19	46	40	-11
	Confidence Factor	92.4%	47.3%	88.9%	55.4%	74.9%	65.6%	88.9%	100.0%	99.7%	74.9%
	Concentration Trend	Prob. Increasing	Stable	No Trend	Stable	No Trend	No Trend	No Trend	Increasing	Increasing	Stable
SW1	Coefficient of Variation	0.21	0.29	0.20	0.30	0.33	0.00	0.22	0.12	0.12	0.09
	Mann-Kendall Statistic (S)	20	-21	-20	-14	25	0	-20	10	10	10
	Confidence Factor	99.3%	99.6%	99.3%	'94.6%	100.0%	45.2%	99.3%	86.2%	86.2%	86.2%
	Concentration Trend	Increasing	Decreasing	Decreasing	Prob. Decreasing	Increasing	Stable	Decreasing	No Trend	No Trend	No Trend

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Site ID	Mann-Kendall Analysis	Anions and Cations					Alkalinity		Inorganics		
		Sodium	Calcium	Magnesium	Sulphate	Chloride	Total Alkalinity as CaCO3	Total Hardness as CaCO3	EC	TDS	pH
SW3	Coefficient of Variation	0.11	0.24	0.32	0.52	0.14	1.47	0.25	0.21	0.19	0.12
	Mann-Kendall Statistic (S)	-2	-14	18	-4	2	-14	3	17	5	-12
	Confidence Factor	53.0%	84.0%	90.5%	59.0%	53.0%	84.0%	56.0%	89.1%	61.9%	79.9%
	Concentration Trend	Stable	Stable	Prob. Increasing	Stable	No Trend	No Trend	No Trend	No Trend	No Trend	Stable
SW4	Coefficient of Variation	0.06	0.19	0.14	0.23	0.06	0.00	0.16	0.08	0.08	0.04
	Mann-Kendall Statistic (S)	8	1	5	-7	-5	0	0	10	10	21
	Confidence Factor	80.1%	50.0%	68.3%	76.4%	68.3%	45.2%	45.2%	86.2%	86.2%	99.6%
	Concentration Trend	No Trend	No Trend	No Trend	Stable	Stable	Stable	Stable	No Trend	No Trend	Increasing

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Table 4.1 and **Table 4.2** provide trend analysis on sampling locations for a number of chemicals, primarily those identified in the EPL as requiring analysis. The trend analysis identifies if the chemical is stable, increasing or decreasing in concentration. This will be useful in future monitoring should a sample be found to be above the adopted trigger value, triggering further assessment.

The majority of the chemicals were found to be stable or no trend was identified. This is typically expected for background monitoring. A number of monitoring locations have identified decreasing trends (i.e. Barium is decreasing in BH4, BH11, SW3 and SW4 and Manganese is decreasing in BH2, BH7, SW1 and SW3). Only a few locations were found to be have an increasing trend (Copper in BH2, Chromium in BH8). Throughout the 12-month sampling period NSW was undergoing one of the worst drought periods on record. Changing concentrations of some chemicals may be due to natural fluctuations in in the water (especially following a rainfall event) and/or could be due to the drought conditions. Should this be the case then when periods of heavy rainfall occur it is likely that changes in chemical concentrations may also occur.

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5. SITE SPECIFIC ASSESSMENT CRITERIA

5.1 SWMP & EMP REQUIREMENTS

As identified in **Section 1.1**Error! Reference source not found. and **1.2** the SWMP requires that surface and groundwater monitoring is to continue as identified in **Section 1.2**. However, it also states that the following monitoring parameters will be reviewed:

- Location of sampling points, e.g. more suitable / representative location identified, or sampling location has insufficient water to accurately monitor development.
- The frequency of the sampling may be reduced, or increased, depending on the fluctuations in the results.
- The parameters may be adjusted to remove superfluous analytes and/or add additional analytes.

Therefore, this section presents a review of the parameters identified and makes recommendations for the ongoing monitoring program. It is noted that any proposed changes must be approved by the Department's Secretary (or delegate) and must also be updated in the SWMP.

5.2 EPL REQUIREMENTS

The sites EPL minimum requirements for the monitoring of groundwater are outlined in **Table 5.1** below.

Table 5.1 EPA Site water monitoring requirements (EPL21264)

Pollutant	Unit of measure	Frequency	Sampling Method	Sample location
Arsenic	mg/L	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
Conductivity	mS/cm	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
Depth	M	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
Iron	mg/L	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
Manganese	mg/L	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
pH	pH	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S
Turbidity	Nephelometric Turbidity Units (NTU)	Monthly	Grab Sample	BH2, BH4, BH6, BH7, BH9, BH11 & MW239S

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5.3 ANALYTICAL PARAMETERS

This section provides details on the recommended analytical suite for ongoing monitoring (note this is in addition to the requirements of the EPL).

5.3.1 Metals

Beryllium, Cadmium, Mercury, Selenium, Vanadium were all identified to be below the laboratory LOR throughout the 12-month sampling period. The operations across the Site are not considered likely to introduce sources of these metals and therefore it is not considered necessary to continue to monitor for these metals. Analysis for lead identified only four samples out of 124 to be above the LOR and these were reported at the LOR. Analysis for Cadmium identified only 3 samples at SW1 to be at or marginally above the LOR. It is recommended that Lead and Cadmium also be removed from the monitoring programme.

Concentrations of Boron were identified to be present above the LOR in 7 samples. However, the exception is SW1 where all samples taken had concentrations above LOR. Cobalt was found to be above LOR in one sample with the exception of surface water and in BH7. There are no trigger values presented in the ANZECC 2000 guidelines. It is considered unlikely that the quarrying operations would introduce Boron and Cobalt into the environment at significant concentrations and therefore it is recommended that Boron and Cobalt not be analysed in groundwater. However, due to the presence of Boron in SW1 and Cobalt in the surface water, both Boron and Cobalt should continue to be monitored in surface water. Should future surface water monitoring identify an increase in Boron or Cobalt concentrations, then consideration should be given to adding these to the groundwater analytical suite.

It is recommended that 8 Metals continue to be analysed in groundwater and surface water:

- Arsenic (this is required by the EPL);
- Barium (all samples were above LOR, there is no ANZECC criteria for Barium);
- Chromium (samples were found to be above LOR and some samples were found to be above the ANZECC trigger criteria);
- Copper (samples were found to be above LOR and some samples were found to be above the ANZECC trigger criteria);
- Iron (this is required by the EPL);
- Manganese (this is required by the EPL);
- Nickel (samples were found to be above LOR and some samples were found to be above the ANZECC trigger criteria); and
- Zinc (samples were found to be above LOR and some samples were found to be above the ANZECC trigger criteria).

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An additional two metals (Boron and Cobalt) should also be analysed in surface water.

5.3.2 Nutrients

Concentrations of Total Phosphorous and Total Nitrogen were found to be elevated above ANZECC 2000 Trigger Values for a low land river in south-east Australia in a number of sampling locations on multiple occasions.

Concentrations of Ammonia were also identified to be present above LOR, however, concentrations were all recorded below the ANZECC 2000 Trigger Values and aesthetic ADWG values.

It is therefore considered appropriate to maintain sampling to identify potential significant changes in concentrations that would impact the local environment.

5.3.3 Hydrocarbons

With the exception of 4 samples, all concentrations were found to be below the LOR. However, the quarry operations plan to store diesel fuel on site for the operational plant. The site will also have a maintenance workshop where oils, greases, lubricants and cleaning agents (degreasers) will be stored and used on site. It is therefore necessary to continue to monitor for hydrocarbons.

It is recommended that TRH continues to be monitored. Should the TRH identify concentrations of C_6 to C_{10} then this should trigger further analysis of BTEXN. Likewise, should concentrations of C_{16} to C_{40} be identified then this should trigger the analysis of PAH.

5.3.4 PFAS

The majority of results were identified to be below the LOR. However, due to the sensitive nature of PFAS and the location of the site being on the edge of the Williamtown Red Zone, PFAS monitoring should continue.

5.4 LOCATIONS

BH2, BH4, BH6, BH7, BH9, BH11 and MW239S are required to be monitored on a monthly basis as part of the EPL requirements. It is noted that MW9 has been dry consistently through the background monitoring period.

In addition to the above it is recommended that BH8 also be monitored.

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5.5 SCHEDULE

Monthly monitoring is required by the EPL. It is not recommended that additional monitoring be undertaken above this every month.

It is recommended that quarterly monitoring be undertaken to include:

- 8 metals (as identified above);
- TRH;
- PFAS;
- Nutrients (Total Phosphorus, Total Nitrogen and Ammonia as N); and
- and the inclusion of sampling BH8.

As part of the quarterly monitoring, all available wells should be gauged for groundwater depths and observed for monitoring well condition.

In order to review and confirm the continued relevance of the outcome of this summary document and proposed analytical program, an annual monitoring event should be undertaken including all analytes and locations sampled as part of the background monitoring.

Additional analysis may be required should there be a recorded spill event or other potential pollution incident.

5.6 SUMMARY OF PROPOSED SAMPLING

Table 5.2 provides a summary of the proposed ongoing operational monitoring schedule for the site. **Table 5.3** provides a summary of the proposed testing schedule for the different monitoring events.

Table 5.2 Proposed operational monitoring schedule

Location	Monthly	Quarterly	Annually
BH2, BH4, BH6, BH7, BH9, BH11 and MW239S	✓	✓	✓
BH8 SW1, SW2, SW3, SW4		✓	✓
BH1, BH5, BH12			✓

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Table 5.3 Proposed testing schedule

Monthly	Quarterly	Annually
• Conductivity; • pH; • Depth; • Turbidity; • Arsenic; • Iron; and • Manganese.	• Gauging all available wells; • Conductivity; • pH; • Depth; • Turbidity; • Nutrients (Total Phosphorus, Total Nitrogen and Ammonia as N); • 8 metals (As, Ba, Cr, Cu, Fe, Mg, Ni and Zn); • Additional 2 metals (B and Co) for surface water; • TRH; and • PFAS.	• Gauging all available wells; • Conductivity; • pH; • Depth; • General water quality parameters (Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Hardness & TDS); • Nutrients (Total Phosphorus, Total Nitrogen and Ammonia as N); • Turbidity; • Metals (As, B, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, V, Zn); • TRH and BTEXN; and • PFAS.

5.7 SITE SPECIFIC TRIGGER VALUES

As discussed in **Section 1.3** one of the objectives of this report is to establish Site specific trigger values to be used for long-term monitoring during the operation of the sand quarry. An exceedance of a trigger value does not necessarily indicate that there is an unacceptable risk on site, but rather a trigger for further investigation or evaluation of management options (CRC-CARE Technical Report 10: 2011). **Section 5.8** provides details on the proposed action response should a trigger value be exceeded.

The baseline groundwater and surface water assessment criteria adopted for future quarry extraction works for locations to be monitored under the Sites EPL, and defined in the SWMP, are summarised below. Nationally accepted water quality guidelines; ANZECC (2000) *Australian and New Zealand Water Quality Guidelines for Fresh and Marine Waters, 95% species Protection for freshwater,* HEPA NEMP (2018) *PFAS National Environmental Management Plan* and ADWG (2011) *Australian Drinking Water Guidelines 6,* have been considered in developing site specific trigger values.

Table 5.4 and **Table 5.5** presents the proposed trigger values for groundwater and surface water respectively along with a justification for selecting that value. The trigger values are to be applied to the sample locations monitored monthly and quarterly. Locations monitored as part of the annual monitoring should be compared against currently available data for that location only as they have not been considered when developing the trigger values.

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Table 5.4 Site specific trigger values for Groundwater

Analyte	Units	Adopted Site specific trigger value	Location	Justification
Inorganics				
pH	pH units	4 - 7	Site wide	The lowest pH value recorded was 4.37 (noting 4.0 in surface water). It is feasible that pH values could continue to be low. The highest pH value recorded was 6.21 indicating a generally acidic environment. It is therefore unlikely the pH would exceed 7.
Total Phosphorus	mg/L	2	Site wide	The majority of baseline results were found to be elevated above the ANZECC 2000 trigger values for a Lowland river in South-east Australia. It is therefore not considered appropriate to use this criterion. The majority of baseline sample results were less than 2mg/L, however it is noted that the highest value recorded was 2.76mg/L at BH3 (noting one sample event and the well is no longer operational) and 2.11mg/L in BH11. The third highest concentration of 1.97mg/L was located at BH8. The sample locations identified represent a large cross section of the Site therefore represent the likely range that could be expected at the Site.
Ammonia as N	mg/L	0.5	Site wide	The detected range of <0.01-0.34mg/L was not found to be elevated above the ANZECC 2000 and ADWG. Based on the results obtained it is considered that adopting the 0.5mg/L ADWG provides a conservative value for a trigger response. It is noted that the ANZECC criteria is 0.9mg/L.
Total Nitrogen as N	mg/L	3	Site wide	Results from the majority of locations were generally found to be elevated above the ANZECC 2000 trigger values, with the exception of BH1 where concentrations were recorded to be marginally lower than the initial criteria. The highest concentrations were recorded in BH11 (considered to be up hydraulic gradient of the Site) and BH2 located centrally on Site. Concentrations as high as 2.2mg/L (in BH7) were identified at locations down/ cross hydraulic gradient of the Site. It is evident that concentrations of Nitrogen can be found naturally across the Site and can be varied over time. Concentrations of Total Nitrogen are not expected to be elevated above the highest recorded value of 5.9mg/L. However, to maintain a level of conservatism a trigger value of 3mg/L (half the highest concentration) has been adopted understanding that four previous samples exceeded this value. Elevated concentrations above the adopted trigger value is a requirement to look at the concentration with more detail to determine if it is in line with previous sampling results or considered to be an outlier potentially presenting a significant increase.
Electrical Conductivity @ 25°C*	µc/cm	125-2200	Site wide	Concentrations across the Site were identified to vary considerably. However, no concentration was found to be elevated above 2200 µc/cm. Trigger criteria has been taken from ANZECC 2000 for a lowland river is south-eastern Australia and is considered appropriate.

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
Turbidity	NTU	6-50	Site wide	Criteria taken from ANZECC 2000 for a lowland river is south-eastern Australia.
Dissolved Metals				
Arsenic	mg/L	0.003	Site wide	Arsenic was not detected within the majority of groundwater locations with the exception of BH8 recording a maximum concentration of 0.003 mg/L. The adopted trigger value has been taken as the maximum value obtained throughout the baseline monitoring period.
Barium	mg/L	0.035	Site wide	All results for Barium were found to be above the LOR. The highest concentration recorded was 0.034mg/L in BH6 (considered to be up/ cross hydraulic gradient of the Site). The adopted trigger value has been taken to be one significant figure above the highest concentration.
Chromium	mg/L	0.004	Site wide	All locations recoded concentrations of chromium at or marginally above LOR. Exceedances above initial baseline criteria (ANZECC 2000) were recorded at most locations with the exception of BH4 & BH6. The adopted trigger value has been taken as the maximum value obtained throughout the baseline monitoring period.
Copper	mg/L	0.013	Site wide (except BH4)	Detections of copper concentrations above LOR were recorded at all locations. The adopted trigger value has been taken as the maximum value obtained throughout the baseline monitoring period.
		0.051	BH4	Concentration range for copper at location BH4 was generally greater than other locations. It is feasible that stormwater runoff from the adjacent Cabbage Tree Road may impact this borehole. Therefore, a higher specific trigger value has been adopted which is the highest concentration identified during the baseline monitoring.
Iron	mg/L	4.1	Northern Half (BH6, BH7, BH8, BH11 and MW239S),	The Site can be divided into a northern section and southern section with an access road between the two sections (between BH2 and SW2). The north and south areas are divided by surface water (where SW2 and SW3 are located). Upon review of the groundwater data from the baseline monitoring it appears that there are greater concentrations of iron in the northern area than the southern area. Two separate criteria have been developed based on this. The highest concentration identified during the baseline monitoring for this area has been adopted as the Trigger Value.
		1	Southern half (BH2, BH4, BH9)	The highest concentration identified during the baseline monitoring for this area has been adopted as the Trigger Value.

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
				BH1, BH5, BH12 are only proposed to be sampled during the annual monitoring round. When assessing these wells, concentrations will be assessed against previous criteria for those locations.
Manganese	mg/L	0.136	Site wide	A similar range of results were identified across all locations. BH4 recorded the highest value of Manganese (0.136mg/L) across the Site. The highest concentration identified during the baseline monitoring has been adopted as the Trigger Value. It is noted that the ANZECC 2000 criteria is 1.9mg/L.
Nickel	mg/L	0.037	BH11	BH11 is located to the north of the Site and is considered to be in an up hydraulic gradient location. The highest concentration identified in BH11 was 0.037mg/L. This has been adopted as the trigger value for this location.
		0.022	Site wide (excluding BH11)	With the exception of BH6 and MW239S, at least one concentration from each monitoring location throughout the baseline monitoring was found to be elevated above than the ANZECC 2000 trigger values. Generally, concentrations of Nickel are similar across the Site (with the exception of BH11). Therefore, the highest recorded value from the baseline monitoring round has been adopted as the trigger value.
Zinc	mg/L	0.085	Site wide	At least one concentration from each monitoring location throughout the baseline monitoring was found to be elevated above than the ANZECC 2000 trigger values. Generally, concentrations of Zinc are similar across the Site. Therefore, the highest recorded value from the baseline monitoring round has been adopted as the trigger value. Noting that BH1 is not proposed to be sampled until the annual monitoring round where the results should be assessed against previous results from that location only.
TRH				
TRH C_6 – C_{10}	µg/L	20	Site wide	Concentrations of TRH were identified to be below the LOR for the majority of the baseline monitoring. The exceptions were following well maintenance work or were observed in BH4 following a high rainfall event. It is feasible that stormwater runoff from the adjacent Cabbage Tree Road may locally impact BH4. Based on the understanding of the above, generally TRH is not identified within the groundwater across the Site. The Laboratory LOR has therefore been adopted as a trigger value.
C_6 - C_{10} minus BTEX (F1)	µg/L	20	Site wide	
TRH C_{10} – C_{16}	µg/L	100	Site wide	
TRH C_{10} - C_{16} minus N (F2)	µg/L	100	Site wide	
TRH C_{16} – C_{34}	µg/L	100	Site wide	

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
TRH C_{34} - C_{40}	µg/L	100	Site wide	
PFAS				
PFOS+ PFHxS	µg/L	0.07	Site wide	Site criteria has been provided in the SWMP. In 2016, Food Standards Australia New Zealand (FSANZ) were commissioned to develop health-based guidance values for a selection of PFAS. FSANZ (2017) published levels for use in Site investigations which were updated and incorporated into the HEPA NEMP (2018), which was revised in 2019. The HEPA NEMP (2019) is the recognised national guidance for the investigation and management of PFAS in Australia and forms the key guidelines for this SWMP.This has therefore been adopted in this report.
PFOA	µg/L	0.56	Site wide	
PFOS	µg/L	0.01	Site wide	Standard LOR has been adopted as the Site wide criteria as it is known that PFAS are widely present in the local area owing to the Red Zone. Ambient concentrations have been detected above this in groundwater emanating from Williamtown RAAF Base.

1- National Health and Australian Drinking Water Guidelines 6 (ADWG) (2011)
ANZECC (2000) 95% level of species protection in freshwater -

Table 5.5 Site specific trigger values for Surface water

Analyte	Units	Adopted Site specific trigger value	Location	Justification
Inorganics				
pH	pH units	4 - 7	Site wide	The lowest pH value recorded was 4.01 in surface water). It is feasible that pH values could continue to be low. The highest pH value recorded was 6.21 indicating a generally acidic environment. It is therefore unlikely the pH would exceed 7.
Total Phosphorus	mg/L	0.13	Site wide	The two out of the 10 surface water baseline results were found to be above the ANZECC 2000 trigger values for a Lowland river in South-east Australia. It is therefore not considered appropriate to use this value. The highest recorded value in the surface water was 0.13mg/L in SW1. This value has been adopted as the trigger value for surface water.
Ammonia as N	mg/L	0.25	Site wide	The detected range of <0.01-0.16mg/L was not found to be elevated above the ANZECC 2000 and ADWG. Based on the results obtained it is considered that adopting half the 0.5mg/L ADWG value provides a conservative approach for a trigger level. It is noted that the ANZECC criteria is 0.9mg/L.

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
Total Nitrogen as N	mg/L	1.8	Site wide	Results from the majority of locations were found to be elevated above the ANZECC 2000 trigger criteria. The highest concentrations were recorded in SW1. It is evident that concentrations of Nitrogen can be found naturally across the Site and vary over time. Concentrations of Total Nitrogen are not expected to be elevated above the highest recorded value of 1.8mg/L. Therefore, this has been adopted as the trigger value.
Electrical Conductivity @ 25°C*	µc/cm	125-2200	Site wide	Concentrations across the Site were identified to vary considerably. However, no concentration was found to be elevated above 2200 µc/cm. Trigger criteria has been taken from ANZECC 2000 for a lowland river is south-eastern Australia and is considered appropriate for this Site.
Turbidity	NTU	6-50	Site wide	Criteria taken from ANZECC 2000 for a lowland river is south-eastern Australia.
Dissolved Metals				
Arsenic	mg/L	0.001	Site wide	Arsenic was not detected within the majority of groundwater locations with the exception of SW3 recording a maximum concentration of 0.006 mg/L. As the majority of results were recorded below the LOR, the adopted trigger value has been taken as the laboratory LOR.
Barium	mg/L	0.08	Site wide	All results for Barium were found to be above the LOR. The highest concentration recorded was 0.08mg/L in SW3. The adopted trigger value has been taken to be the highest concentration recorded.
Boron	mg/L	0.14	SW1	All results at SW1 for Boron were found to be above the LOR compared to all other locations that had concentrations below LOR. Therefore, a location specific trigger value has been adopted for SW1.
		0.05	SW3 & SW4	All results were found to be below the LOR. The adopted trigger value has been taken as LOR.
Chromium	mg/L	0.002	Site wide	The majority of results were found to be below the LOR with one result higher than the ANZECC 2000 trigger value recorded in SW3. The adopted trigger value has been taken as the maximum value obtained throughout the baseline monitoring period.
Cobalt	mg/L	0.017	Site wide	Detections of Cobalt concentrations above LOR were detected at all surface water locations. The highest concentration was 0.017mg/L in SW1. The adopted trigger value has been taken to be the highest concentration recorded.
Copper	mg/L	0.013	Site wide	Detections of Copper concentrations above LOR were recorded at all locations. The adopted trigger value has been taken as the same value as the groundwater trigger value. The maximum value obtained in surface water throughout the baseline monitoring period was 0.012mg/L.

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
Iron	mg/L	9.26	Site wide	The concentrations of Iron identified in the surface water monitoring results were varied and the Mann-Kendal analysis identified a decreasing trend in SW1 and SW3 and no trend in SW4. The highest concentration identified during the baseline monitoring for this area has been adopted as the Trigger Value. Based on the trend analysis it is not expected this value would be exceeded.
Manganese	mg/L	0.048	SW1 & SW3	Concentrations of manganese in SW1 and SW3 were found to be similar. The highest concentration identified has been adopted as the trigger value for these locations.
		0.841	SW4	Concentrations of manganese in SW4 were found to be elevated above those in SW1 and SW3. It is feasible that stormwater runoff from the adjacent Cabbage Tree Road may impact this location. Therefore, the highest concentration found in SW4 has been taken as the trigger value.
Nickel	mg/L	0.022	Site wide	Concentrations of nickel in each of the surface water locations was found to be similar. The highest concentration identified in SW1 was 0.02mg/L. This is similar to the trigger value adopted for groundwater; therefore, the same value has been adopted as the trigger value.
Zinc	mg/L	0.085	SW1 & SW3	Concentrations of Zinc in SW1 and SW3 were found to be similar. The highest concentration identified has been adopted as the trigger value for these locations.
		0.535	SW4	Concentrations of Zinc in SW4 were found to be elevated above those in SW1 and SW3. It is feasible that stormwater runoff from the adjacent Cabbage Tree Road may impact this location. Therefore, the highest concentration found in SW4 has been taken as the trigger value.
TRH				
TRH C_6 – C_{10}	µg/L	20	Site wide	All concentrations of TRH were identified to be below the LOR. The Laboratory LOR has therefore been adopted as the trigger value.
C_6 - C_{10} minus BTEX (F1)	µg/L	20	Site wide	
TRH C_{10} – C_{16}	µg/L	100	Site wide	
TRH C_{10} - C_{16} minus N (F2)	µg/L	100	Site wide	
TRH C_{16} – C_{34}	µg/L	100	Site wide	
TRH C_{34} - C_{40}	µg/L	100	Site wide	

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Analyte	Units	Adopted Site specific trigger value	Location	Justification
PFAS				
PFOS+ PFHxS	µg/L	0.07	Site wide	Site criteria has been provided in the SWMP. In 2016, Food Standards Australia New Zealand (FSANZ) were commissioned to develop health-based guidance values for a selection of PFAS. FSANZ (2017) published levels for use in Site investigations which were updated and incorporated into the HEPA NEMP (2018). The HEPA NEMP (2018), revised in 2019, is the recognised national guidance for the investigation and management of PFAS in Australia and form the key guidelines for this SWMP. This has therefore been adopted in this report.
PFOA	µg/L	0.56	Site wide	
PFOS	µg/L	0.01	Site wide	Standard LOR has been adopted as the Site wide criteria as it is known that PFAS are widely present in the local area owing to the Red Zone. Ambient concentrations have been detected above this in groundwater emanating from Williamtown RAAF Base.

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5.8 TRIGGER RESPONSE ACTIONS

5.8.1 Metals & Nutrients

The following provides details on the proposed response action required should an analyte concentration be found above the adopted trigger value:

- Review value against previous data including Mann-Kendal trends presented in **Table 4.1** to determine if the concentrations is in line with previous monitoring data, or if considered significantly different then:
  - Question result with the laboratory;
  - Discuss what operations have been undertaken that may cause the elevated concentration; and
  - Review rainfall data and groundwater elevations to establish if concentration is due to seasonal adjustments.
- Re-sample location and elevated metal in the following two monthly monitoring rounds to gauge if the exceedance was an exception of change in trend or characteristic of background changes.

Where the outcome of the above assessment indicates a potential contamination issue then a water trigger investigation should be undertaken in accordance with the SWMP (see **Section 5.8.4**).

5.8.2 Hydrocarbons

The following provides details on the proposed response action required should an analyte concentration be found above the adopted trigger value:

- Question result with the laboratory to determine if there were any laboratory errors;
- Discuss what operations have been undertaken that may cause the elevated concentration;
- Review rainfall data and groundwater elevations to establish if concentration is due to seasonal adjustments; and
- Re-sample location in the following two monthly monitoring rounds to gauge if the exceedance was an exception of change in trend, or characteristic of background changes, and include the following additional analysis:
  - Where TRH C_6 to C_{10} has been detected then BTEXN will also be analysed; and/or
  - Where TRH C_{16} to C_{40} has been detected then PAH will also be analysed.

Where the outcome of the above indicates a potential issue then a water trigger investigation should be undertaken in accordance with the SWMP (see **Section 5.8.4**).

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Where a spill or potential pollution incident event has occurred, or the above conversation with the quarry operations indicates a potential contamination issue, then sampling (or re-sampling) at the closest (down hydraulic gradient) location should be undertaken within 48 hours. An incident investigation in accordance with the SWMP must be undertaken.

5.8.3 PFAS

Where PFAS is identified above the adopted criteria (or maximum background value detected previously at a specific monitoring location) an additional water sample will be collected within 48 hours and submitted for analysis. In the event the trigger value is exceeded by more than 10% in both the primary sample and the follow-up sample, a water trigger Investigation will be completed to determine if the change is related to:

- The quarry operations;
- External influence; and/or
- Natural variation.

5.8.4 Water Trigger Investigation

Upon triggering the need for a water trigger investigation Hunter Water Corporation (HWC), NSW Environmental Protection Agency (EPA) and Department of Planning Industry and Environment (DPIE) must be notified within 24hours. The SWMP stipulates that the water trigger investigation will evaluate the following:

- A review of the site conceptual site model to understand the risk potential of the exceedance;
- Identify the potential for other sources to be present that may require confirmatory sampling (and include intrusive investigation if considered appropriate);
- Recent climate and rainfall data;
- Other activities within the catchment (both on and off the Site) in the preceding period;
- Operational activities of the quarry in the preceding period; and
- Historical potential for those quarry activities to cause exceedance.

The water trigger investigation report will be submitted as an incident notification to HWC, EPA and DPIE. The report will also be summarised in the Annual Environmental Review (AER).

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6. QUALITY ASSURANCE AND QUALITY CONTROL

6.1 DATA VALIDATION

The QA/QC program implemented for this monitoring program followed the requirements of the SWMP.

Data Quality Indicators (DQIs) were developed prior to commencing background monitoring and have been summarised in **Table 6.1.** DQIs established acceptable limits for field and laboratory data collected from the monitoring program.

Table 6.1 QA/QC data quality indicators

QA/QC Objective	Data quality indicator (DQI)
Successful completion of project	To conduct a baseline water quality sampling program in accordance with NEPM 2013 and AS4482.1 – 1999 in order to achieve the objective set out in **Section 1**.
Suitable environmental consultant	The environmental consultant was to maintain QA Systems certified to AS/NZS ISO 9001:2015.
Suitable field personnel	All Kleinfelder field personnel conducting sampling were to be trained in the requirements detailed in this SWMP. All Kleinfelder field personnel have relevant tertiary qualifications and have demonstrated competence in Kleinfelder procedures for sampling (consistent with NEPM 2013 and AS4482.1 - 1999).
Adequate sample collection density	The sampling strategy was developed based on historical information available for the site and the objective of the investigation.
Standardised sample nomenclature	All samples were labelled with a unique identifier that can be related to sample location. Surface water and Groundwater samples were labelled as per monitoring well ID. The following naming convention was utilised: Bore Hole (BH) – Number (1, 2, 3…): E.g. MW1 Surface water (SW) – Number (1, 2, 3…): E.g. SW1
Decontamination of field equipment	When sampling equipment was used, nitrile gloves were worn and changed between locations. Non-dedicated sampling equipment was decontaminated between sample locations using an appropriate surface-active cleaning agent (e.g. Liquinox for use with PFAS) as consistent with NEPM 2013 and HEPA NEMP (2019).
Calibration of field instruments	All field instruments were calibrated prior to use, and the calibration certificates have been provided in **Appendix A**.
Transportation	A Chain of Custody (COC) document was used to ensure the integrity of the samples from collection to receipt by the analytical laboratory within appropriate holding times.
National Association of Testing Authorities (NATA) accredited laboratory analysis	All samples were forwarded to a laboratory holding NATA accreditation for the required analyses. The following Laboratories were utilised: • ALS – Primary Laboratory for chemical analysis; and • Eurofins – Secondary Laboratory for chemical analysis.

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QA/QC Objective	Data quality indicator (DQI)
Field QA/QC	Duplicate samples (intra-laboratory) were collected at a rate of one in every twenty (1:20) primary water samples and submitted to the primary laboratory for analysis. Standard NEPM 2013 duplicate and triplicate requirements were deemed reasonable for the sampling of PFAS for the purpose of baseline water monitoring. Triplicate samples (inter-laboratory) were also collected at a rate of one in every twenty (1:20) primary water samples and submitted to the secondary laboratory for analysis. Field duplicate and triplicate samples are used to assess field and analytical precision and the precision measurement is determined using the relative percent difference (RPD) between the primary sample (X1) and duplicate sample (X2) results, as shown in the following equation: $\text{Relative percent difference (RPD)} = \frac{(X1 - X2)}{(X1 + X2)/2} \times 100$ Generally, it is recommended that RPD is <30% (NEPM 2013). Default RPD levels in the field may be non-compliant for the following reasons: • The differing laboratory equipment, procedures and limits of reporting (between the primary and secondary laboratories); • Due to sample matrix interference; and/or • Due to the reported concentrations being close to the limit of reporting where laboratory precision and accuracy are inherently low. A rinsate blank sample was collected for each piece of non-dedicated sampling equipment per day onsite and submitted to the primary laboratory for analysis. A transport blank sample was collected for each batch of samples sent to the laboratory (~one per day in the field) and submitted to the primary laboratory for analysis for each day samples are taken. QA/QC non-compliance was documented and discussed in the monthly summary letter (see **Appendix B**). Where exceedances were identified (i.e. duplicates and triplicates be above the RPD or rinsate blanks, field blanks or transport blanks be above the LOR) then consideration was given to the sample(s) being re-analysed, the higher concentration level to be conservatively adopted and/or reviewing field practices for continued prevention of potential cross contamination.
Laboratory Quality Control – Duplicates, spikes, blanks and surrogates – Acceptable Limits	Laboratory QA/QC acceptance limits are as follows: Surrogates: 70% to 130% recovery; Matrix Spikes: 70% to 130% recovery for organics or 80% to 120% recovery for inorganics; Control Samples: 70% to 130% recovery for soil or 80% to 120% recovery for waters; Duplicate Samples: <4 Practical Quantitation Limits (PQL) - +/- 2PQL, 4-10PQL – 0.-25 or 50%RPD, >10PQL – 0-10 or 30%RPD; and Method Blanks: zero to <PQL.

6.2 QA/QC RESULTS

6.2.1 Field Method Validation

To ensure the completeness, comparability, representativeness, precision and accuracy of QA/QC items, **Table 6.2** details how the QA/QC compliance has been met.

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Table 6.2 Field QA/QC

QA/QC Objective	Data Quality Indicator (DQI)
Suitable field personnel	The site work was undertaken by Dan Kousbroek who has 4 years' experience in contaminated land investigations. Dan was informed of the requirements of the agreed scope of works. Dan has relevant tertiary qualifications and has demonstrated competence with Kleinfelder's sampling procedures (consistent with NEPM 2013 requirements and AS4482.1 2005).
Adequate sample collection density	Water sampling was undertaken based on information provided in the SWMP. A targeted sampling program was undertaken requiring sampling at 10 groundwater locations and 4 surface water locations and then analysed. It is noted that a number of the surface water locations were found to be dry throughout the 12 months due to an extended drought period in NSW.
Field equipment	YSI 556 Water Quality Meter and Solinst oil/water interface meter were used during field works.
Calibration of field instruments	Calibration certificates for each piece of equipment used in the field are attached in **Appendix A**
Sample preservation	Samples were collected in laboratory supplied containers and immediately stored in an insulated esky chilled with ice.
Sample handling	Samples were delivered straight to ALS Newcastle following each sampling event. Chains of custody are included in Appendix A of the monthly reports**,** which have been provided as **Appendix B** of this document.

6.2.2 Laboratory QA/QC

The results for internal laboratory QA/QC procedures are provided within the laboratory analysis reports (Appendix A of the monthly reports, which have been provided as **Appendix B** of this document). **Table 6.3** summarises conformance to specific QA/QC procedures, also see **Tables E, F** and **G** at the rear of this report for a summary of the data.

Table 6.3 Laboratory QA/QC

Quality assurance	Conformed	Comment
Collection of rinsate water from decontaminated field equipment	Yes	Rinsate was sourced from a NATA accredited laboratory and supplied with the sample containers. A rinsate sample was taken from the sampling equipment during each sampling event. A total of 12 rinsate samples were taken. All samples were non detect. See **Tables E, F** and **G** at the back of this report.
Collection of transport blanks through the sampling day	Majority	12 transport blank samples were collected (two samples in March (due to a return confirmatory sampling event), no transport taken in August 19) 2nd transport blank taken in March (15/03/19) was found to contain barium (2ug/l). As no other transport blanks were found to have concentrations above LOR and the following months samples resulted in non detect the data is considered reliable. See **Tables E, F** and **G** at the back of this report.
Holding times met	Yes	Holding times were met for all analytes and samples. Every effort was made by Kleinfelder to deliver samples to the laboratory as soon as possible after sampling.

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Quality assurance	Conformed	Comment
LOR less than assessment criteria	Yes	Majority of LOR were below the adopted screening criteria. Adopted criteria for PFOS (HEPA NEMP 2018) is below LOR. It is noted that PFAS are likely to be in the region given the reported scale of PFAS in groundwater within the Red Zone, therefore the standard LOR has been adopted.
All analyses National Association of Testing Authorities (NATA) accredited	Yes	All samples were delivered to a NATA accredited laboratory for the required analysis, within specified holding times. The primary laboratory used was ALS (delivered to the Newcastle laboratory). Triplicate samples were forwarded by ALS to the secondary laboratory, Eurofins mgt (Newcastle).
Field intra-laboratory duplicate samples collected and analysed to represent 5% of sample population	Majority	One intra-laboratory duplicate sample and one inter-laboratory triplicate water sample were collected. This is considered to exceed the requirement of 5% of the total number of primary analyses undertaken (minimum 1 in 20 duplicate and 1 in 20 triplicate samples). Due to a laboratory error in transferring samples, one intra-laboratory triplicate (March 2019) was only sampled for Metals and PFAS with TRH and BTEX being missed from the COC to the tertiary laboratory. With the exception of some minor elevations of TRH and BTEX which were attributed to maintenance work on the well, there were no recorded concentrations above LOR. Therefore, this is not considered to impair the reliability of data in meeting the objectives of this monitoring programme. See **Table 6.5** for details.
Did duplicate sample meet RPD requirements	Majority	The majority of samples met the RPD requirements of being within 30% (See **Tables E, F** and **G** at the back of this report). The following did not meet these requirements: • Arsenic – 67% BH8 (Feb 2019) • Cobalt – 40% BH7 (March 2019) • Copper – 190% SW4 (September 2019) • Lead – 67% SW4 (September 2019) • Nickel – 140% SW4 (September 2019), 67% BH6 (January 2020) • Zinc – 100% BH8 (February 2019), 151% SW4 (September 2019) In general, for these exceedances at least one sample was found to be below or close to the Laboratory LOR, which leads to exaggerated RPD calculations. In order to take a conservative approach, the highest recorded concentration has been selected for results screening. These RPD exceedances are therefore not considered to have a negative impact on the outcome of the assessment.
Did triplicate sample meet RPD requirements	Majority	The majority of samples met the RPD requirements of being within 30% (See **Tables E, F** and **G** at the back of this report). The following did not meet these requirements: Water: • Arsenic – 67% BH8 (February 2019) • Chromium – 86% BH8 (February 2019), 67% SW3 (June 2019) • Cobalt – 40% • Copper – 190% SW4 (September 2019), 156% BH6 (January 2020)

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Quality assurance	Conformed	Comment
		• Lead – 67% SW4 (September 2019) • Nickel – 156% BH7 (March 2019), 140% SW4 (September 2019), 111% SW4 (November 2019) • Zinc – 113% BH7 (March 2019), 151% SW4 (September 2019), 172% SW4 (November 2019) & 131% BH6 (January 2020) • PFOS – 100% SW4 (September 2019) • Sum of PFHxS and PFOS – 100% (September 2019) • Sum of PFAS (WA DER List) – 86% (September 2019) • Sum of PFAS – 133% (September 2019) A number of exceedances were calculated with one sample being below the Laboratory LOR. This leads to a potentially exaggerated RPD calculations. In order to take a conservative approach, the highest recorded concentration has been selected for results screening. RPD exceedances for triplicates can often be attributed to differences in methods used by each of the labs and are not considered to impair the reliability of the data in meeting the objectives of this monitoring programme.
Internal laboratory procedures	Majority.	Holding time breaches are discussed above. Internal laboratory QC procedures were generally met. Some exceedances of internal procedures for laboratory duplicates and matrix spikes were recorded for water samples, for organic analysis. However, the primary laboratory results recorded these analytes to be below the LOR. Therefore, this does not impair the reliability of the analytical data for decision making. This is not considered to impact the outcome of the results and thus unlikely to impair the outcome of decision making.

A summary of the water sample container types, preservation and the order of container filling is provided in **Table 6.4**.

Table 6.4 Container types, preservation and order of filling

Analyte	Container Type	Preservation
PFAS incl PFOS, PFOA, PFOS/PFHxS, PFDS	1 x 60mL Plastic Bottle - Unpreserved	Refrigerate
TPH (C_{10}-C_{36})	1 x 100mL Amber Glass Bottle - Unpreserved	Refrigerate
TRH (C_6-C_{10}), BTEXN, VOC	2 x 40mL amber Glass Vials with Teflon lined septa	Sulfuric Acid
Heavy metals - Dissolved	1 x 60mL Clear Plastic Bottle - Filtered	Nitric acid
Extended Water Suite	1 x 500mL Clear Plastic Bottle – Unpreserved 1 x 60mL Clear Plastic Bottle	Refrigerate Sulfuric Acid
General Water Suite	1 x 500mL Clear Plastic Bottle – Unpreserved	Refrigerate

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Table 6.5 Summary of groundwater QC program

Analyte	Number of Groundwater Samples Analysed			% QC Samples Relative to Primary Samples
	Primary	Field Duplicates (intra-lab)	Laboratory Splits (inter-lab)	
TRH	124	6	**5**	**9%**
BTEXN	124	6	**5**	**9%**
Dissolved metals	124	6	6	10%
PFAS	65	5	5	15%

Bold: Indicates not meeting the triplicate density.

6.3 QUALITY STATEMENT

Field sampling procedures conformed to Kleinfelder's QA/QC protocols to prevent cross contamination, preserve sample integrity and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory useability.

Based on a review of the results for the Kleinfelder and laboratory QA/QC program adopted, the overall data quality is considered to be suitably reliable and representative of groundwater conditions beneath the Site. Copies of the final NATA endorsed laboratory reports, including internal QA/QC results and chain-of-custody documentation for the primary and secondary laboratories are attached as Appendix A of the monthly reports, which have been provided as **Appendix B** of this document.

6.4 EQUIPMENT CALIBRATION

All equipment used was supplied calibrated with appropriate calibration certificates (see **Appendix A**). Kleinfelder undertook pre-mobilisation checks of equipment (including calibration as required). Prior to commencing field operations, the following equipment and calibration checks were conducted:

- **Water Quality Meter** – The water quality meter came calibrated from the supplier. A daily confidence check of dissolved oxygen, pH and EC was undertaken using air and standards of known concentration, and calibration performed as warranted.
- **PID** – the PID came calibrated from the supplier. A daily fresh air calibration check was undertaken on site.

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7. SUMMARY STATEMENT

A baseline water monitoring program was conducted at the Site to characterise groundwater and surface water for ongoing use of the Site as an operational sand quarry from February 2019 through to January 2020.

The analytical results indicate that metals, namely barium, chromium, copper, iron manganese, nickel and zinc, were detected regularly throughout the monitoring period, and at the majority of the sample locations, indicating likely natural background concentrations. Iron concentrations were typically higher at BH1 throughout the baseline monitoring program which are likely indicative of concentrations in this area.

BTEXN, TPH and TRH were generally not detected across the majority of the Site with the exception of BH1 and BH4. At the initiation of the baseline sampling program in February 2019 BH1 was refitted with a PVC pipe to replace a previously fire damaged one. In the process an acrylic adhesive was applied to fuse the pipes together which likely initiated increased concentrations of TPH C_6 - C_9 (1,710µg/L) and TRH C_6 - C_{10} (1,690µg/L) within the well. The subsequent months following reinstallation of the well concentrations of TPH and TRH fell to below LOR. Concentration of hydrocarbons detected at BH4 are most likely influenced by the adjacent Cabbage Tree Road. Concentrations were detected following some form of rainfall in the region and ongoing detections are likely given the location of BH4 being in close proximity to a relatively busy carriageway. Ongoing monitoring of hydrocarbons is recommended, for due diligence purposes, given the potential likelihood for spills to occur from operational vehicles.

PFAS detections above LOR were recorded at locations BH4, BH6 and SW4. Concentrations of PFAS identified at BH6 and SW4 are likely sourced from an upgradient source from the Site, namely the Williamtown RAAF Base where historical use of PFAS containing materials have been used. PFAS identified at location BH4, and directly adjacent to Cabbage Tree Road, is likely to have occurred from a different historical source. Ongoing monitoring of PFAS should be undertaken directly following initial excavation works.

It should also be noted that the Site and regional area has experienced a significant drought over the past couple of years and this may have a bearing on groundwater and surface water conditions should significant rainfall reoccur in the region. Baseline data provided within this report should be reassessed following a full year of data with average to above average rainfall to identify potential outliers that may be present.

Table 7.1 provides a summary of the proposed ongoing operational monitoring schedule for the Site. **Table 7.2** provides a summary of the proposed testing schedule for the different

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monitoring events and presents the adopted groundwater (GW) and surface water (SW) trigger values.

Table 7.1 Proposed operational monitoring schedule

Location	Monthly	Quarterly	Annually
BH2, BH4, BH6, BH7, BH9, BH11 and MW239S	✓	✓	✓
BH8 SW1, SW2, SW3, SW4		✓	✓
BH1, BH5, BH12			✓

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Table 7.2 Proposed testing schedule

Testing schedule			Specified Location otherwise site wide	Trigger value		
Monthly	Quarterly	Annually		Units	GW	SW
pH	pH	pH			4 - 7	4 - 7
Conductivity	Conductivity	Conductivity		µc/cm	125-2200	125-2200
Turbidity	Turbidity	Turbidity		NTU	6-50	6-50
Arsenic	Arsenic	Arsenic		mg/L	0.003	0.001
Iron	Iron	Iron	Northern Half (BH6, BH7, BH8, BH11 and MW239S),	mg/L	4.1	9.26
			Southern half (BH2, BH4, BH9)	mg/L	1	
Manganese	Manganese	Manganese		mg/L	0.136	0.048
Gauging selected wells	Gauging all available wells;	Gauging all available wells;		-	-	-
	Total Phosphorus	Total Phosphorus		mg/L	2	0.13
	Total Nitrogen	Total Nitrogen		mg/L	3	1.8
	Ammonia as N	Ammonia as N		mg/L	0.5	0.25
	Barium	Barium		mg/L	0.035	0.08
	Chromium	Chromium		mg/L	0.004	0.002
	Copper	Copper	Site wide (except BH4)	mg/L	0.013	0.013
			BH4	mg/L	0.051	
	Nickel	Nickel	BH11	mg/L	0.037	0.022
			Site wide (excluding BH11)	mg/L	0.022	
	Zinc	Zinc	Site wide (excluding SW4)	mg/L	0.085	0.085
			SW4	mg/L		0.535
	Boron	Boron	SW1	mg/L	N/A	0.14
			SW2, SW3 & SW4	mg/L		0.05
	Cobalt	Cobalt		mg/L	N/A	0.017

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Testing schedule			Specified Location otherwise site wide	Trigger value		
Monthly	Quarterly	Annually		Units	GW	SW
	TRH C_6 – C_{10}	TRH C_6 – C_{10}		µg/L	20	20
	C_6 - C_{10} minus BTEX (F1)	C_6 - C_{10} minus BTEX (F1)		µg/L	20	20
	TRH C_{10} – C_{16}	TRH C_{10} – C_{16}		µg/L	100	100
	TRH C_{10} - C_{16} minus N (F2)	TRH C_{10} - C_{16} minus N (F2)		µg/L	100	100
	TRH C_{16} – C_{34}	TRH C_{16} – C_{34}		µg/L	100	100
	TRH C_{34} - C_{40}	TRH C_{34} - C_{40}		µg/L	100	100
	PFOS	PFOS		µg/L	0.01	0.01
	PFOS+ PFHxS	PFOS+ PFHxS		µg/L	0.07	0.07
	PFOA	PFOA		µg/L	0.56	0.56
		General water quality parameters (Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Hardness & TDS);		-	-	-

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FIGURES

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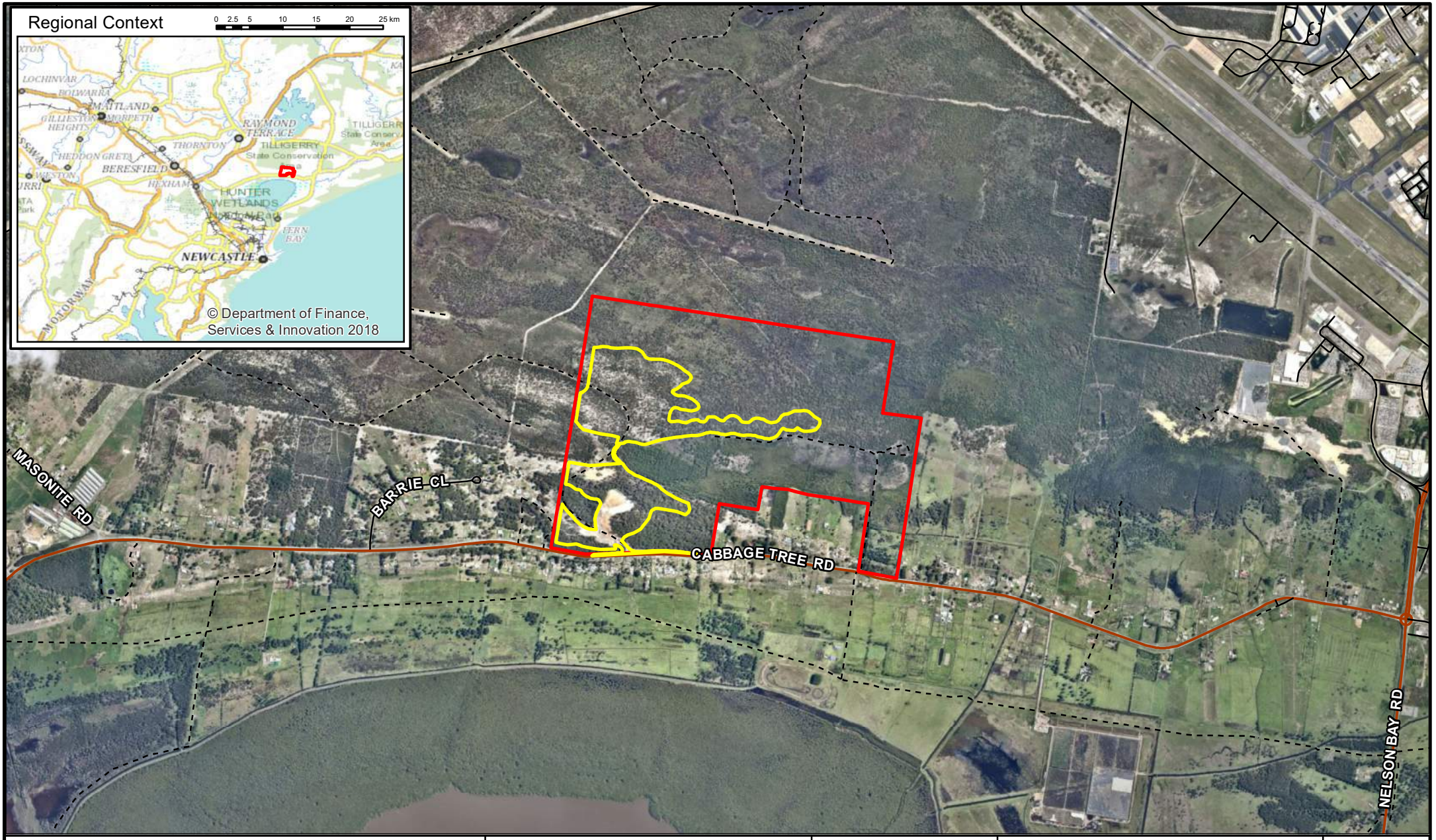

Legend

- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

km
0 0.1 0.2 0.4 0.6 0.8 1

N

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PROJECT REFERENCE: 20193820

DATE DRAWN: 11/03/2020 10:25 Version 1

DRAWN BY: BDeane

DATA SOURCE:
NSW DFSI - 2018
nearmap - 2020

Site Location

Williamtown Sand Syndicate
Cabbage Tree Road Sand Quarry
Baseline Water Quality Summary Report
Cabbage Tree Road, Williamtown

FIGURE:

1

L:\GIS FOLDER\00 CLIENT FILES\126863_TrusteeForWSS_UnitTrust\20170448_Williamtown\Mapping\20193820_BWQSR_Fig01_SiteLocation.mxd

Bore ID	GDA 1994 MGA Zone 56		Water Level	Note
	Easting	Northing		
BH1	387741	6369496	Dip	
BH2	387705	6369175	Logger	Down-gradient monitoring site
BH3	387752	6368964	Logger	
BH4	387855	6368743	Logger	Down-gradient monitoring site
BH5	388769	6369335	Dip	
BH6	388730	6369582	Dip	Up-gradient control site
BH7	388828	6369245	Dip	Down-gradient monitoring site
BH8	389178	6369272	Dip	
BH9	387520	6368799	Dip	Down-gradient monitoring site
BH10	387931	6369744	Dip	
BH11	387651	6369980	Logger	Up-gradient control site
BH12	388203	6369333	Dip	
MW239S	388619	6369307	Logger	Down-gradient monitoring site
SW1	387887	6368734	Marker post	Pond
SW2	387988	6369234	Marker post	Pond
SW3	388465	6369057	Marker post	Channel
SW4	389049	6368969	Marker post	Channel
SW5	388248	6368707	Culvert depth	High rainfall only

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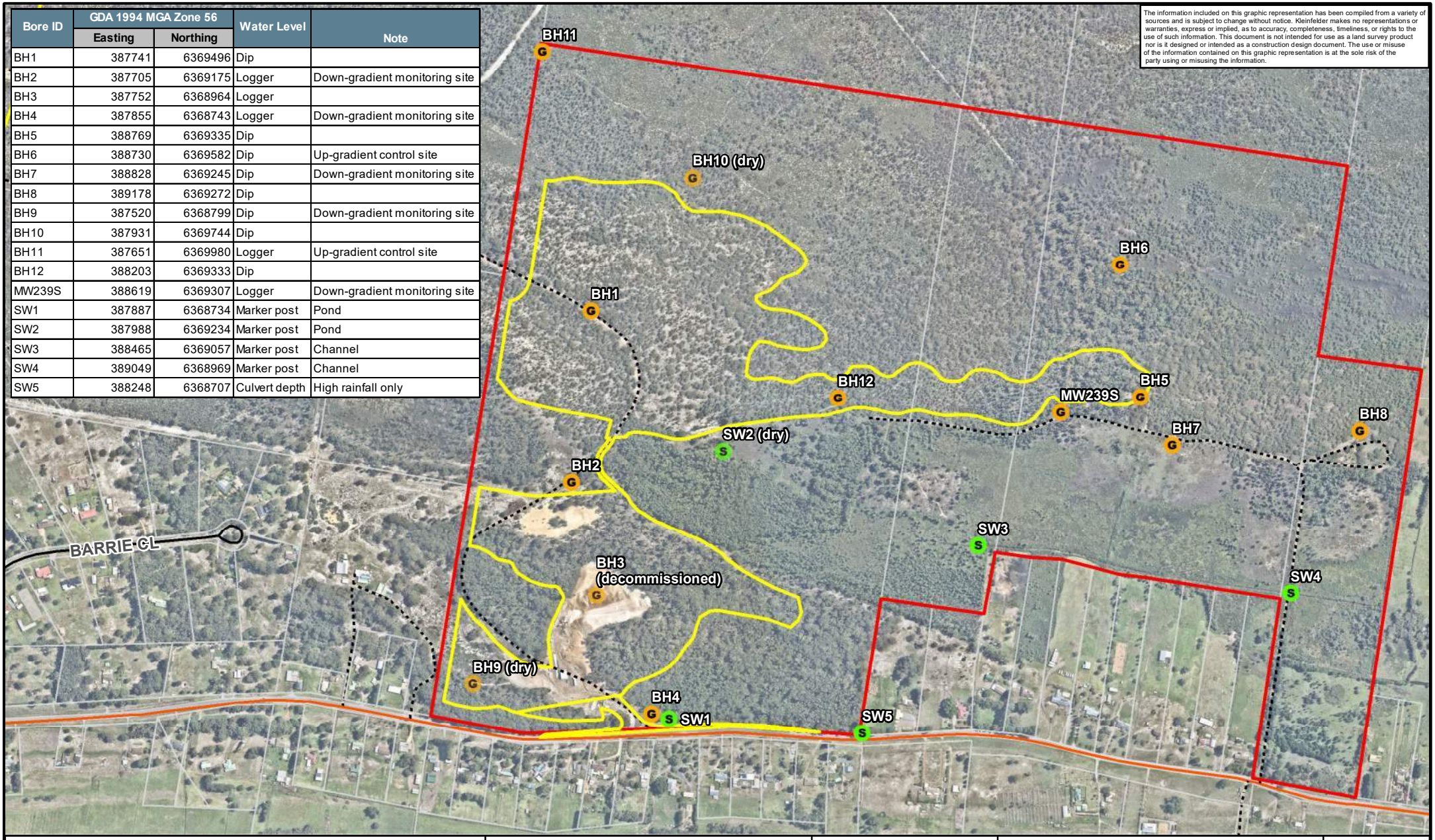

Groundwater Monitoring Sites

- G Groundwater Sample Site
- S Surface Water Sample Site

- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 11/03/2020 10:21 Version 2
DRAWN BY: BDeane
DATA SOURCE:
NSW DFSI - 2018
Nearmap - 2020

Groundwater and Surface Water Sampling Locations

Williamtown Sand Syndicate
Cabbage Tree Road Sand Quarry
Baseline Water Quality Summary Report
Cabbage Tree Road, Williamtown

FIGURE:
2

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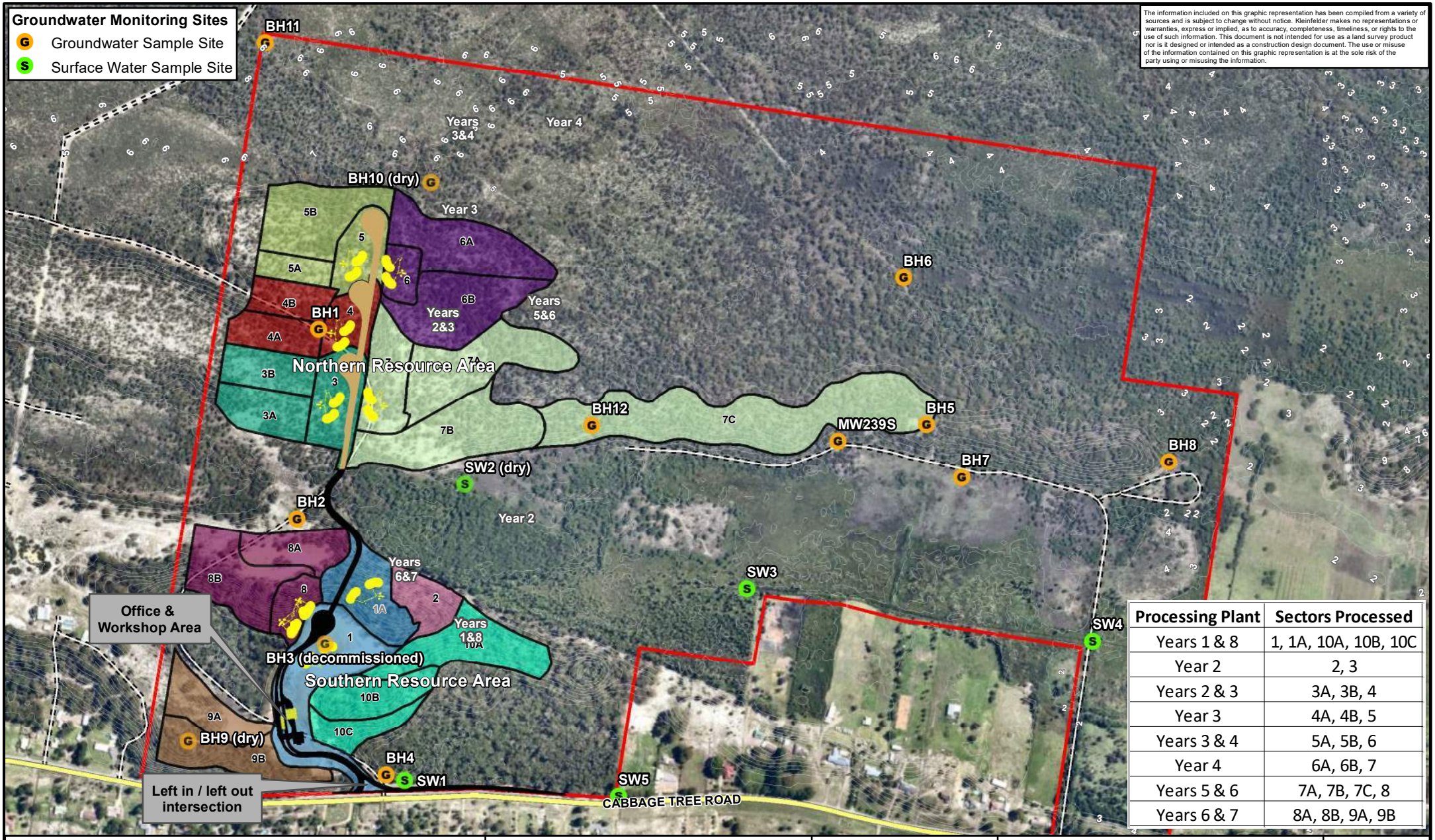

Processing Plant	Sectors Processed
Years 1 & 8	1, 1A, 10A, 10B, 10C
Year 2	2, 3
Years 2 & 3	3A, 3B, 4
Year 3	4A, 4B, 5
Years 3 & 4	5A, 5B, 6
Year 4	6A, 6B, 7
Years 5 & 6	7A, 7B, 7C, 8
Years 6 & 7	8A, 8B, 9A, 9B

DATA TABLES

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Table A
Groundwater and Surface Water Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20	< 100	< 100	**140**	< 100	**140**
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Table A
Groundwater and Surface Water Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH8	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalen

** 95% Level of protection in freshwater

Table B
Groundwater and Surface Water Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals														
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013			0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.006**	**4.32**	< 0.001	**0.007**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.037**
	18-Nov-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**11**	< 0.001	**0.008**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.012**
	17-Dec-19	<0.001	**0.002**	<0.001	<0.05	<0.0001	**0.003**	<0.001	0.001	**8.48**	<0.001	**0.009**	<0.0001	<0.001	<0.01	<0.01	**0.028**
	16-Jan-20	<0.001	**0.003**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.002**	**4.43**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.044**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.004**	**0.74**	< 0.001	**0.006**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	18-Nov-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.95**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.004**	<0.001	**0.06**	<0.0001	**0.002**	<0.001	**0.002**	**1**	<0.001	**0.008**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.005**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**1.08**	<0.001	**0.007**	<0.0001	**0.003**	<0.01	<0.01	**0.005**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.006**	**0.46**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	18-Nov-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.013**	**0.08**	< 0.001	**0.011**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.028**
	17-Dec-19	<0.001	**0.004**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.006**	**0.1**	<0.001	**0.012**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.004**	<0.001	<0.05	<0.0001	<0.001	<0.001	**0.005**	**0.73**	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.01**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
	15-Oct-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.011**	**0.31**	< 0.001	**0.136**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.014**
	18-Nov-19	< 0.001	**0.011**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.005**	< 0.05	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.012**	<0.001	**0.06**	<0.0001	**0.001**	<0.001	**0.008**	<0.05	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.005**
	16-Jan-20	<0.001	**0.014**	<0.001	<0.05	<0.0001	<0.001	<0.001	**0.006**	<0.05	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.009**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
	15-Oct-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.95**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.006**
	18-Nov-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.58**	< 0.001	**0.009**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.073**
	17-Dec-19	<0.001	**0.026**	<0.001	**0.05**	<0.0001	**0.001**	<0.001	**0.003**	**1.78**	<0.001	**0.007**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.032**	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	**2.15**	<0.001	**0.01**	<0.0001	<0.001	<0.01	<0.01	<0.005
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.009**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	**0.003**	**1.32**	< 0.001	**0.018**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.016**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.1**	< 0.001	**0.015**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.009**	<0.001	**0.06**	<0.0001	**0.002**	**0.001**	<0.001	**0.98**	<0.001	**0.011**	<0.0001	**0.003**	<0.01	<0.01	**0.007**
	16-Jan-20	<0.001	**0.01**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**0.93**	<0.001	**0.006**	<0.0001	**0.003**	<0.01	<0.01	**0.007**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	**0.002**	**2.08**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**2.49**	< 0.001	**0.01**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.007**	<0.001	**0.05**	<0.0001	**0.002**	<0.001	**0.003**	**3.02**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.007**
	16-Jan-20	<0.001	**0.007**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**2.94**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.011**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.003**	**0.68**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.1**	< 0.001	**0.004**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.03**
	17-Dec-19	<0.001	**0.008**	<0.001	<0.05	<0.0001	**0.003**	<0.001	**0.001**	**1.33**	<0.001	**0.003**	<0.0001	**0.002**	<0.01	<0.01	<0.005
	16-Jan-20	<0.001	**0.008**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**1.31**	<0.001	**0.004**	<0.0001	**0.002**	<0.01	<0.01	**0.007**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
	15-Oct-19	< 0.001	**0.036**	< 0.001	**0.07**	< 0.0001	< 0.001	**0.005**	**0.003**	**1.61**	< 0.001	**0.383**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.055**
	18-Nov-19	< 0.001	**0.042**	< 0.001	**0.11**	**0.001**	**0.003**	< 0.001	**0.003**	**1.14**	< 0.001	**0.366**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.026**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
	15-Oct-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.005**	**0.002**	**1.7**	< 0.001	**0.027**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.022**
	18-Nov-19	< 0.001	**0.031**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.026**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.041**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.003**	**1.42**	<0.001	**0.026**	<0.0001	**0.001**	<0.01	<0.01	<0.005
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.037**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.004**	**0.66**	< 0.001	**0.031**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.018**
	18-Nov-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**6.32**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table C
Groundwater and Surface Water Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids									
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanes ulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56					
HEPA NEMP 2018***						0.00023						19					
HEPA NEMP 2018[4]												5.6					
Sample Name	Sample Date																
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	**0.02**	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MW239S	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03 ***	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table C
Groundwater and Surface Water Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS	
		Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)
LOR		0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6														0.07	
HEPA NEMP 2018***															
HEPA NEMP 2018[4]														0.7	
Sample Name	Sample Date														
BH11	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH2	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH3	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH4	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	25-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH5	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH6	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	**0.19**	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH7	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH8	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
MW239S	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW1	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW3	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW4	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.03 ***	**0.01**
	25-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.05**	**0.05**
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporti
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Analyte		Sum of PFAS
LOR		0.01
Units		µg/L
NHMRC ADWG 6		
HEPA NEMP 2018***		
HEPA NEMP 2018[4]		
Sample Name	Sample Date	
BH11	21-Feb-19	< 0.01
BH2	22-Feb-19	< 0.01
BH3	21-Feb-19	< 0.01
BH4	21-Feb-19	< 0.01
	15-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	**0.02**
	25-Sep-19	**0.02**
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH5	22-Feb-19	< 0.01
BH6	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	**0.19**
	16-Jan-20	< 0.01
BH7	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH8	21-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
MW239S	22-Feb-19	< 0.01
SW1	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW3	22-Feb-19	< 0.01
	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW4	16-May-19	< 0.01
	16-Sep-19	**0.01**
	25-Sep-19	**0.05**
	18-Nov-19	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporti
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Table D
Groundwater and Surface Water Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations															Total Cations	Total Anions	Ionic Balance
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N			
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
ANZECC 2000 Trigger Values									0.02*	0.05*		0.7**		0.9**	0.35*				
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]					
Sample Name	Sample Date																		
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71	-
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19	-
	17-Dec-19	14	<1	2	<1	5	23	<0.1	-	-	-	-	-	-	-	-	0.77	1.05	-
	16-Jan-20	16	<1	3	<1	3	25	<0.1	-	-	-	-	-	-	-	-	0.94	1.21	-
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3	-
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5	-
	17-Dec-19	26	<1	4	<1	<1	48	<0.1	-	-	-	-	-	-	-	-	1.46	1.39	-
	16-Jan-20	25	<1	3	<1	<1	46	<0.1	-	-	-	-	-	-	-	-	1.33	1.34	-
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67	-
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68	-
	17-Dec-19	13	2	2	<1	8	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.69	-
	16-Jan-20	13	2	2	<1	6	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.72	-
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59	-
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63	-
	17-Dec-19	9	1	1	1	6	16	<0.1	-	-	-	-	-	-	-	-	0.55	0.64	-
	16-Jan-20	13	2	2	2	6	18	<0.1	-	-	-	-	-	-	-	-	0.88	0.71	-
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43	-
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64	-
	17-Dec-19	26	2	4	1	16	42	<0.1	-	-	-	-	-	-	-	-	1.58	1.62	-
	16-Jan-20	30	3	4	2	15	50	0.2	-	-	-	-	-	-	-	-	1.83	1.86	-
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74	-
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89	-
	17-Dec-19	26	<1	5	1	15	44	<0.1	-	-	-	-	-	-	-	-	1.57	1.59	-
	16-Jan-20	27	<1	4	1	13	46	0.2	-	-	-	-	-	-	-	-	1.53	1.63	-

	Alkalinity						Inorganics		
Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
0.01	1	1	1	1	1	1	1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						125-2200			6.5 - 8.0*
					200[3]		600[3]		6.5-8.5[3]
-	**9.0**	< 1.0	< 1.0	**9.0**	**9.0**	**104**	**68**	**129**	**5.67**
-	**10**	< 1.0	< 1.0	**10**	**11**	**84**	**55**	**97**	**5.83**
1.7	**10**	< 1.0	< 1.0	**10**	**8.0**	**105**	**68**	**164**	**5.82**
-	**10**	< 1.0	< 1.0	**10**	**8.0**	**99**	**64**	**72**	**5.52**
-	**11**	< 1.0	< 1.0	**11**	**8.0**	**102**	**66**	**84**	**5.62**
-	**14**	< 1.0	< 1.0	**14**	**8.0**	**128**	**83**	**82**	**6.22**
1.84	**8.0**	< 1.0	< 1.0	**8.0**	**8.0**	**102**	**66**	**88**	**5.44**
-	**4.0**	< 1.0	< 1.0	**4.0**	**8.0**	**98**	**64**	-	**5.5**
2.26	**24**	< 1.0	< 1.0	**24**	**8.0**	**126**	**82**	-	**6.29**
-	**15**	<1	<1	**15**	**8**	**118**	**77**	-	**6.05**
-	**22**	<1	<1	**22**	**12**	**112**	**73**	-	**6.23**
3.21	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**346**	**278**	-	**4.67**
-	< 1.0	< 1.0	< 1.0	< 1.0	**8.0**	**186**	**121**	**144**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**150**	**98**	**135**	**4.99**
3.0	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**188**	**122**	**216**	**4.91**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**175**	**114**	**107**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**318**	**207**	**192**	**4.68**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**197**	**128**	**135**	**4.88**
3.18	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**195**	**127**	**140**	**4.66**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**194**	**126**	-	**4.92**
3.3	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**193**	**125**	-	**5.12**
-	**2**	<1	<1	**2**	**16**	**196**	**127**	-	**5.03**
-	**2**	<1	<1	**2**	**12**	**168**	**109**	-	**5.09**
1.44	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**91**	**128**	-	**4.87**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**101**	**66**	**90**	**4.71**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**70**	**46**	**84**	**4.82**
1.44	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**94**	**61**	**144**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**91**	**59**	**51**	**4.76**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**90**	**58**	**63**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**110**	**72**	**61**	**5.2**
1.32	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**96**	**62**	**60**	**4.72**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**102**	**66**	-	**5.06**
2.02	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**102**	**66**	-	**5.47**
-	**2**	<1	<1	**2**	**13**	**106**	**69**	-	**5.43**
-	**6**	<1	<1	**6**	**13**	**102**	**66**	-	**5.61**
0.46	**9.0**	< 1.0	< 1.0	**9.0**	**14**	**60**	**438**	-	**5.55**
1.15	**6.0**	< 1.0	< 1.0	**6.0**	**9.0**	**73**	**96**	-	**5.4**
-	< 1.0	< 1.0	< 1.0	< 1.0	**5.0**	**77**	**50**	**70**	**5.12**
-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**54**	**35**	**61**	**5.05**
1.3	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**73**	**47**	**100**	**4.99**
-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**69**	**45**	**36**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**75**	**49**	**42**	**4.96**
-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**85**	**55**	**49**	**5.01**
1.32	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**95**	**62**	**58**	**4.83**
-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**85**	**55**	-	**4.93**
1.86	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**86**	**56**	-	**5.34**
-	**3**	<1	<1	**3**	**7**	**85**	**55**	-	**5.44**
-	**4**	<1	<1	**4**	**13**	**85**	**55**	-	**5.5**
3.59	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**250**	**211**	-	**4.87**
2.49	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**177**	**144**	-	**4.37**
-	**2.0**	< 1.0	< 1.0	**2.0**	**21**	**179**	**116**	**146**	**4.95**
-	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**136**	**88**	**115**	**4.64**
2.04	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**175**	**114**	**214**	**4.88**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**174**	**113**	**90**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**161**	**105**	**82**	**4.73**
-	< 1.0	< 1.0	< 1.0	< 1.0	**17**	**201**	**131**	**104**	**4.87**
2.44	**2.0**	< 1.0	< 1.0	**2.0**	**20**	**197**	**128**	**124**	**4.68**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**202**	**131**	-	**5.17**
2.64	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**204**	**133**	-	**5.32**
-	**5**	<1	<1	5	**21**	**207**	**134**	-	**5.58**
-	**7**	<1	<1	7	**24**	**218**	**142**	-	**5.51**
3.16	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**213**	**196**	-	**4.76**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**271**	**176**	**212**	**4.73**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**205**	**133**	**185**	**4.51**
3.26	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**235**	**153**	**310**	**4.87**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**213**	**138**	**145**	**4.91**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**202**	**131**	**164**	**5.0**
-	**8.0**	< 1.0	< 1.0	**8.0**	**16**	**232**	**151**	**168**	**5.53**
2.79	**5.0**	< 1.0	< 1.0	**5.0**	**16**	**222**	**144**	**181**	**5.07**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**252**	**164**	-	**4.95**
2.89	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**239**	**155**	-	**4.97**
-	**2.0**	<1	<1	**2.0**	**20**	**210**	**136**	-	**5.14**
-	**3**	<1	<1	**3**	**16**	**202**	**131**	-	**5.27**

Table D
Groundwater and Surface Water Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																	
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
ANZECC 2000 Trigger Values									0.02*	0.05*		0.7**		0.9**	0.35*				
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]					
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	-
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06	-
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	-	2.29	2.06	-
	18-Nov-19	49	< 1.0	4.0	< 1.0	8.0	80	< 0.1	< 0.01	0.58	< 0.01	0.01	0.01	0.17	1.3	1.3	2.46	2.42	-
	17-Dec-19	50	<1	4	<1	10	75	<0.1	-	-	-	-	-	-	-	-	2.5	2.36	-
	16-Jan-20	49	<1	4	<1	13	78	<0.1	-	-	-	-	-	-	-	-	2.46	6.61	-
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	-
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69	-
	15-Oct-19	58	< 1.0	6.0	< 1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	-	3.02	3.21	3.15
	18-Nov-19	63	< 1.0	6.0	1.0	8.0	118	< 0.1	< 0.01	0.23	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	3.26	3.5	3.48
	17-Dec-19	65	<1	8	<1	6	127	<0.1	-	-	-	-	-	-	-	-	3.48	3.75	3.62
	16-Jan-20	67	<1	8	<1	7	120	<0.1	-	-	-	-	-	-	-	-	3.57	3.57	0.03
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	2.12
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	5.38
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	-	8.82	8.03	4.68
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	1.1	1.1	9.45	10	3.03
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61	-
	15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	-	2.56	2.48	-
	18-Nov-19	36	5.0	5.0	< 1.0	29	56	< 0.1	< 0.01	0.04	< 0.01	0.01	0.01	0.03	0.6	0.6	2.23	2.18	-
	17-Dec-19	40	4	7	1	25	57	<0.1	-	-	-	-	-	-	-	-	2.54	2.25	
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	-
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	-
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	-	2.4	2.45	-
	16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57	-
	15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1	-	-	-	-	-	-	-	-	2.71	2.4	-
	18-Nov-19	41	4.0	5.0	< 1.0	41	64	0.2	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	0.2	0.2	2.76	2.66	-

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

	Alkalinity						Inorganics		
Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
0.01	1	1	1	1	1	1	1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						125-2200			6.5 - 8.0*
					200[3]		600[3]		6.5-8.5[3]
4.44	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**352**	**258**	-	**4.46**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**319**	**207**	**253**	**4.77**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**264**	**172**	**223**	**4.76**
4.86	**1.0**	< 1.0	< 1.0	**1.0**	**16**	**302**	**196**	**354**	**4.9**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**315**	**205**	**194**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**353**	**229**	**226**	**4.78**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**260**	**169**	**140**	**5.0**
5.43	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**293**	**190**	**206**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**303**	**197**	-	**5.02**
5.06	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**316**	**205**	-	**5.12**
-	**2**	<1	<1	**2**	**16**	**328**	**213**	-	**5.02**
-	**7**	<1	<1	**7**	**16**	**318**	**207**	-	**5.55**
5.21	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**329**	**234**	-	**4.89**
-	**2.0**	< 1.0	< 1.0	**2.0**	**25**	**410**	**266**	**232**	**5.02**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**294**	**191**	**208**	**4.92**
4.44	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**327**	**212**	**320**	**4.87**
-	**7.0**	< 1.0	< 1.0	**7.0**	**25**	**334**	**217**	**220**	**5.39**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**353**	**229**	**188**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**359**	**233**	**195**	**4.83**
4.7	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**373**	**242**	**224**	**4.66**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**404**	**263**	-	**4.86**
5.38	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**419**	**272**	-	**4.76**
-	**2**	<1	<1	**2**	**33**	**439**	**285**	-	**5.01**
-	**2**	<1	<1	**2**	**33**	**423**	**275**	-	**5.02**
-	< 1.0	< 1.0	< 1.0	< 1.0	**299**	**893**	**580**	**707**	**4.01**
2.45	< 1.0	< 1.0	< 1.0	< 1.0	**233**	**947**	**616**	**715**	**4.6**
-	< 1.0	< 1.0	< 1.0	< 1.0	**190**	**847**	**550**	**512**	**4.5**
-	< 1.0	< 1.0	< 1.0	< 1.0	**194**	**876**	**569**	**568**	**4.42**
-	< 1.0	< 1.0	< 1.0	< 1.0	**177**	**813**	**528**	**548**	**4.53**
3.49	< 1.0	< 1.0	< 1.0	< 1.0	**213**	**1,080**	**702**	**689**	**4.32**
-	< 1.0	< 1.0	< 1.0	< 1.0	**168**	**1,050**	**682**	-	**5.32**
4.91	< 1.0	< 1.0	< 1.0	< 1.0	**158**	**1,090**	**708**	-	**5.06**
3.38	**11**	< 1.0	< 1.0	**11**	**26**	**262**	**228**	-	**6.21**
-	**4.0**	< 1.0	< 1.0	**4.0**	**40**	**344**	**224**	**279**	**5.42**
-	< 1.0	< 1.0	< 1.0	< 1.0	**45**	**220**	**143**	**190**	**5.2**
2.47	**1.0**	< 1.0	< 1.0	**1.0**	**38**	**271**	**176**	**300**	**5.24**
-	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**300**	**195**	**170**	**4.58**
-	< 1.0	< 1.0	< 1.0	< 1.0	**69**	**451**	**293**	**246**	**4.47**
-	< 1.0	< 1.0	< 1.0	< 1.0	**44**	**338**	**220**	**192**	**4.47**
2.57	< 1.0	< 1.0	< 1.0	< 1.0	**50**	**374**	**243**	**201**	**4.3**
-	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**383**	**249**	-	**4.75**
2.72	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**278**	**181**	-	**5.39**
	6	<1	<1	**6**	**39**	**301**	**196**		**5.75**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**293**	**190**	**198**	**4.0**
3.1	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**331**	**215**	**288**	**4.08**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**316**	**205**	**163**	**4.31**
-	< 1.0	< 1.0	< 1.0	< 1.0	**46**	**367**	**238**	**207**	**4.46**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**308**	**200**	**160**	**4.48**
3.01	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**360**	**234**	**208**	**4.35**
-	< 1.0	< 1.0	< 1.0	< 1.0	**40**	**365**	**237**	-	**4.48**
3.22	< 1.0	< 1.0	< 1.0	< 1.0	**30**	**348**	**226**	-	**4.48**

Table E
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocar	
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type															
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_03	23-Apr-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE_03	23-Apr-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK_04	16-May-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE_04	16-May-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200	800	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE10_171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RIP BLANK 13_200133300	16-Jan-20	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH6_2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW12_2001333012	16-Jan-20	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW13_14392	16-Jan-20	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	250	300	100	650	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table E
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

bons - Silcia Clean up		Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silcia Clean up				
C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	$>C_{10}$ - C_{16}	$>C_{10}$ - C_{16} minus Naphthalene	$>C_{16}$ - C_{34}	$>C_{34}$ - C_{40}	$>C_{10}$-C_{16} - Silica Cleanup	F2 - Silica Cleanup	$>C_{16}$-C_{34} - Silica Cleanup	$>C_{34}$-C_{40} - Silica Cleanup	$>C_{10}$-C_{40} - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC					NC	NC	NC	NC	NC
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	210	210	400	<100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table F
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals														
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK_03	23-Apr-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_03	23-Apr-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK_04	16-May-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_04	16-May-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09_181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09_181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09_18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	2%	NC	NC	9%	NC	**111%**	NC	NC	**172%**
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE10_171219	17-Dec-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RIP BLANK 13_200133300	16-Jan-20	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH6_2001333004	16-Jan-20	Primary	<0.001	0.032	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.15	<0.001	0.01	<0.0001	<0.001	<0.01	<0.01	<0.005
QW12_2001333012	16-Jan-20	Duplicate	<0.001	0.035	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.18	<0.001	0.009	<0.0001	0.001	<0.01	<0.01	<0.005
Relative Percentage Difference			NC	9%	NC	NC	NC	NC	NC	NC	1%	NC	11%	NC	**67%**	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	<0.001	0.032	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.15	<0.001	0.01	<0.0001	<0.001	<0.01	<0.01	<0.005
QW13_14392	16-Jan-20	Triplicate	< 0.001	0.03	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.001	0.004	1.6	< 0.001	0.009	< 0.0001	< 0.001	-	< 0.005	0.012
Relative Percentage Difference			NC	6%	NC	NC	NC	NC	NC	**156%**	29%	NC	11%	NC	NC	NC	NC	**131%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table G
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids						Perf				
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type											
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 03	23-Apr-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 03	23-Apr-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 04	16-May-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 04	16-May-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC	NC	NC	NC
TRIP BLANK 09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
TRIP BLANK 13_2001333008	16-Jan-20	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW12_2001333012	16-Jan-20	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01
QW13_14392	16-Jan-20	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

Table G
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

fluoroalkyl Carboxylic Acids						Perfluoroalkyl Sulfonamides						
Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table G
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
NC	NC	NC	NC	0%	0%	0%
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
< 0.01	< 0.05	< 0.01	< 0.01	0.03	< 0.05	< 0.1
NC	NC	NC	NC	**100%**	**86%**	**133%**
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC

TREND CHARTS

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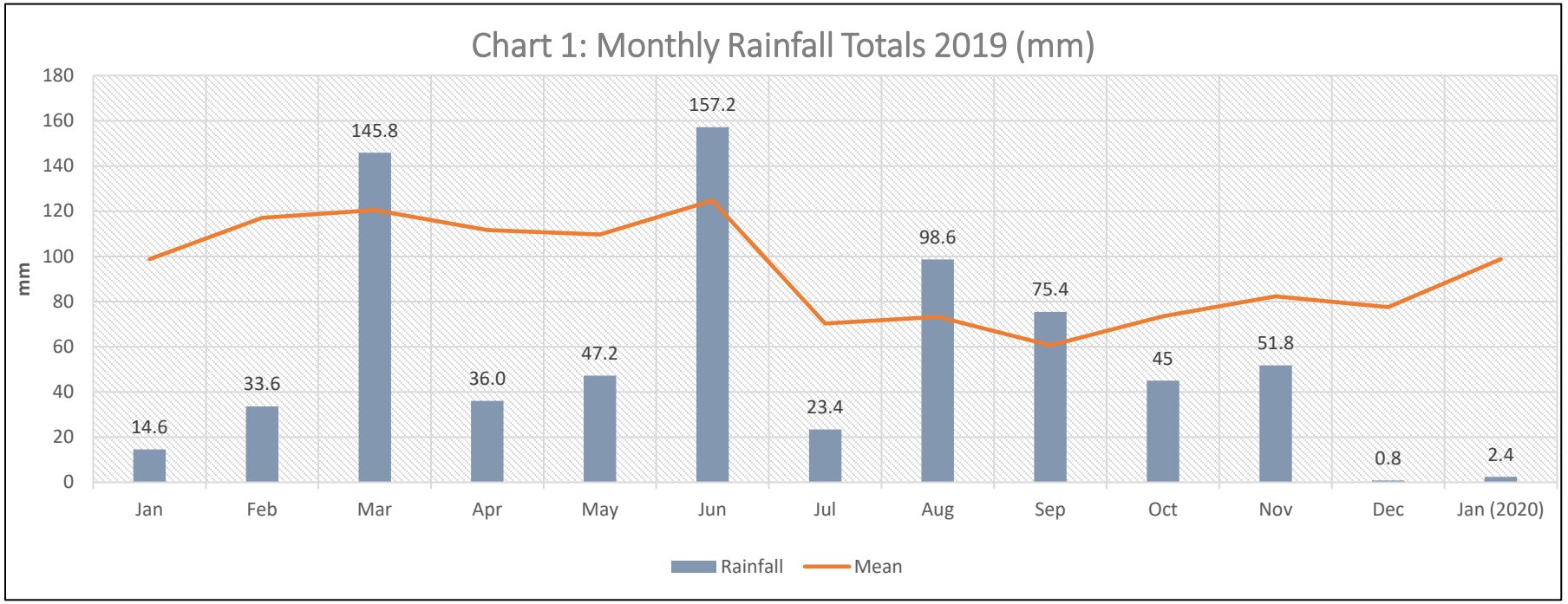


Chart 1: Monthly Rainfall Totals 2019 (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
45
51.8
0.8
2.4
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan (2020)
Rainfall
Mean

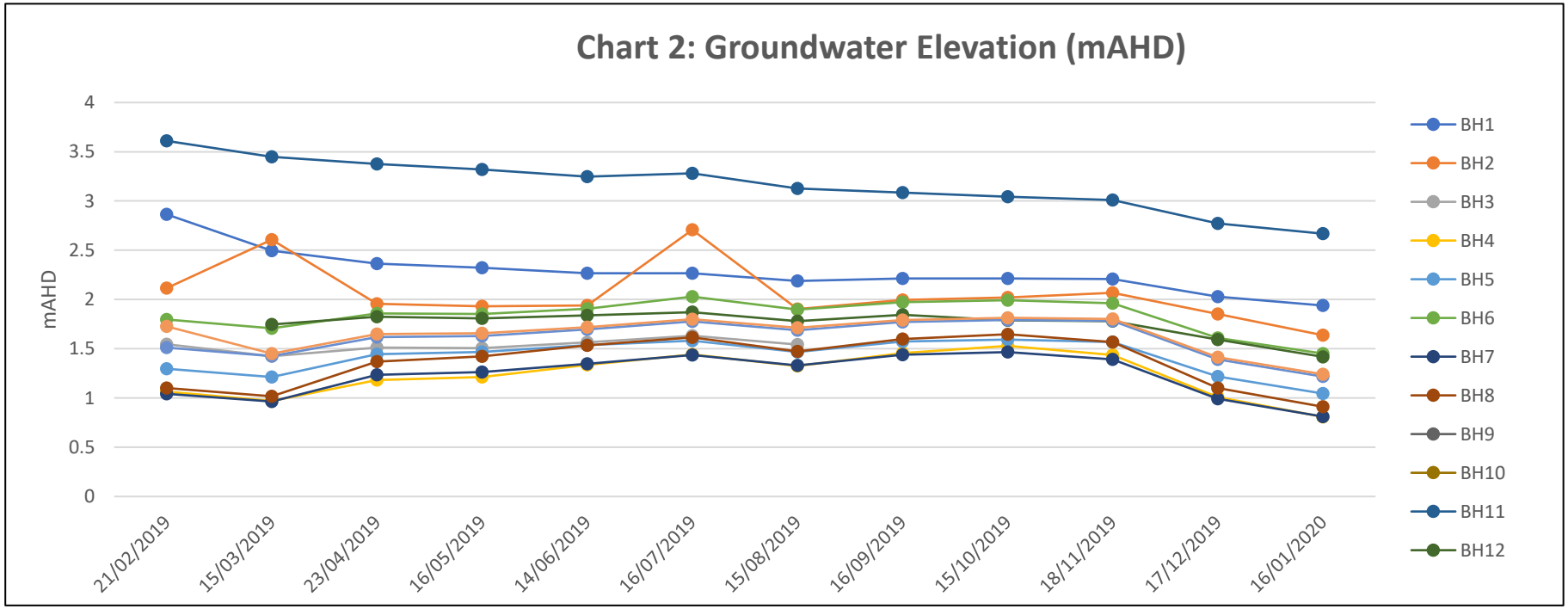


Chart 2: Groundwater Elevation (mAHD)
mAHD
4
3.5
3
2.5
2
1.5
1
0.5
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12

Chart 3: Field EC (µS/cm)

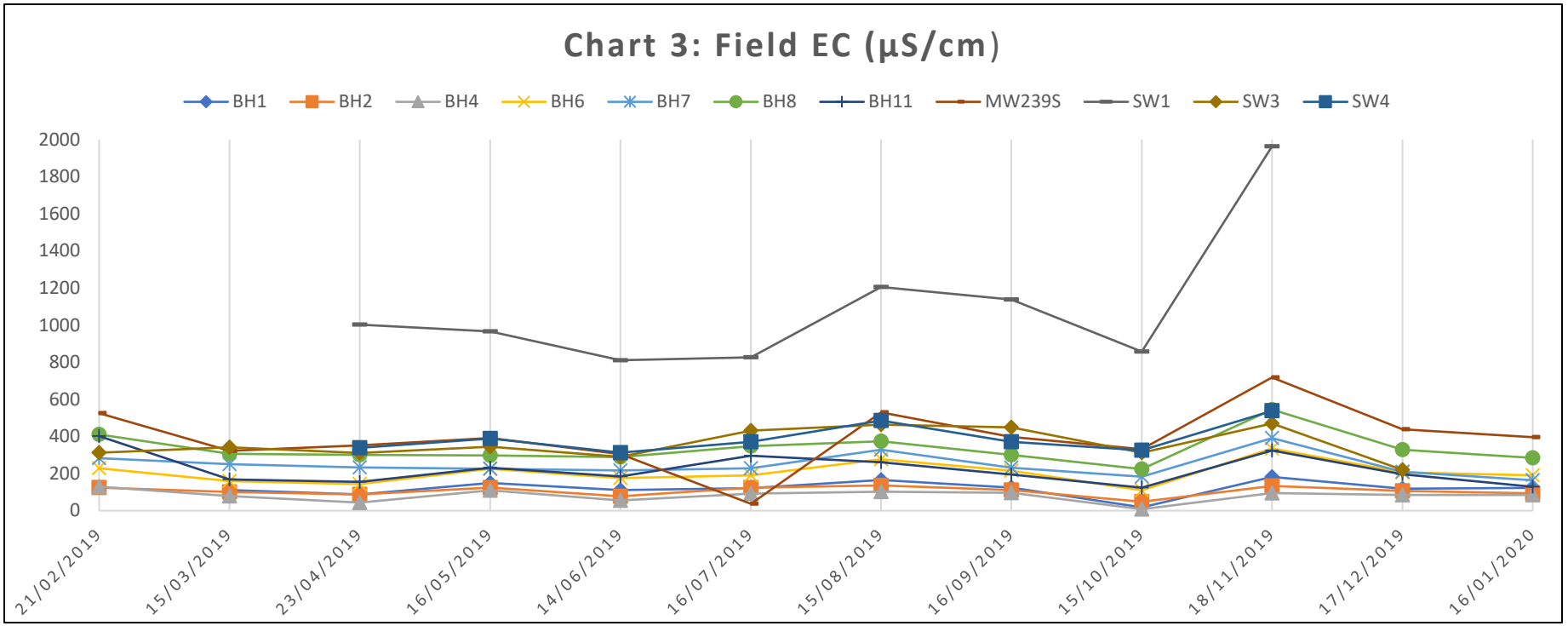
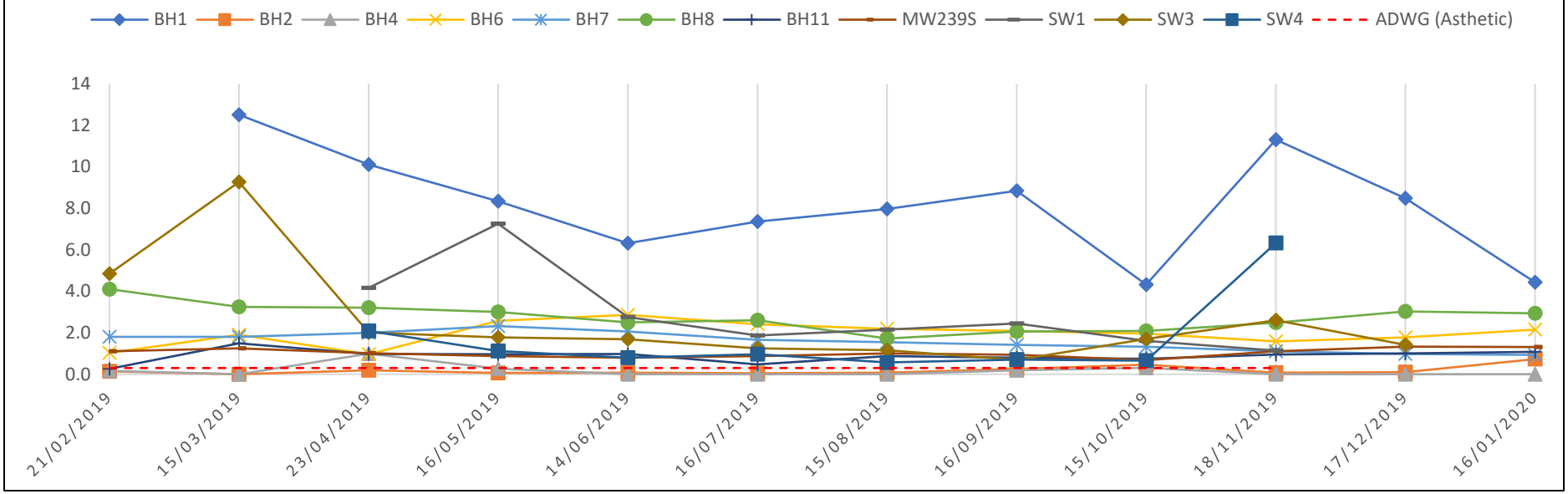


Chart 4: Iron (Fe) mg/L



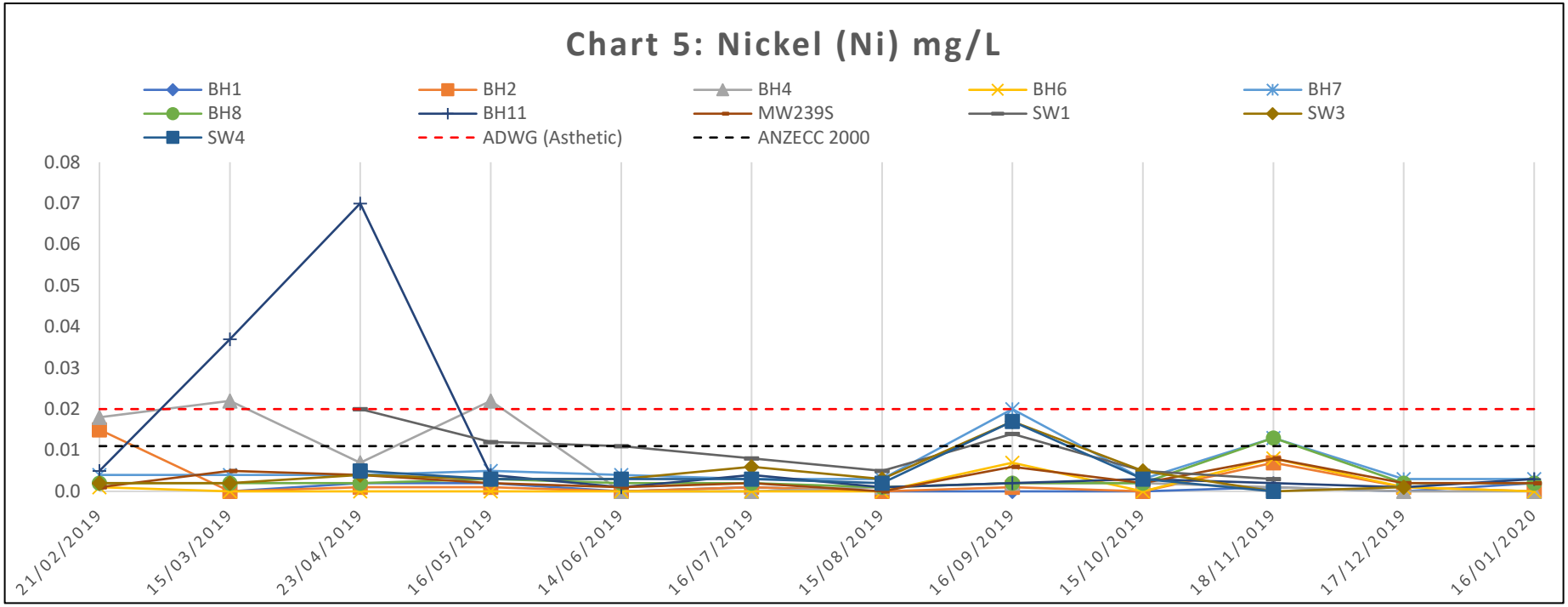


Chart 5: Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

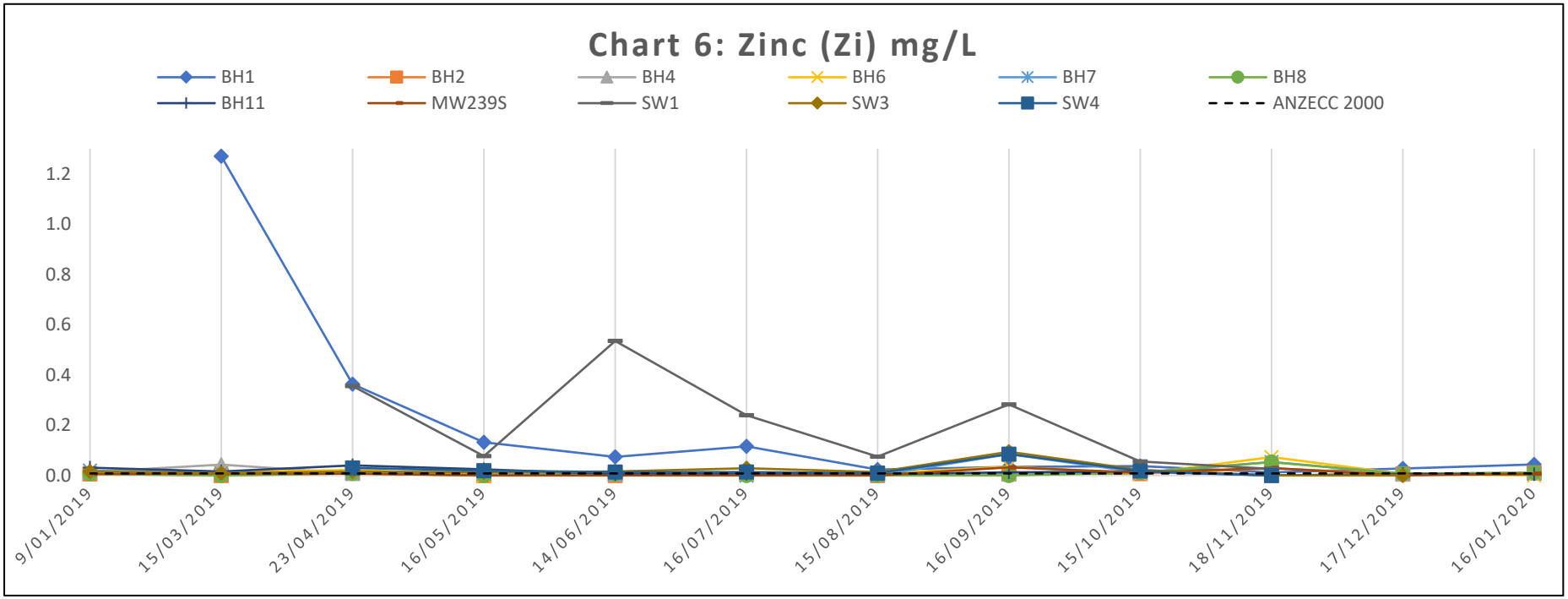


Chart 6: Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1.0
0.8
0.6
0.4
0.2
0.0
9/01/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

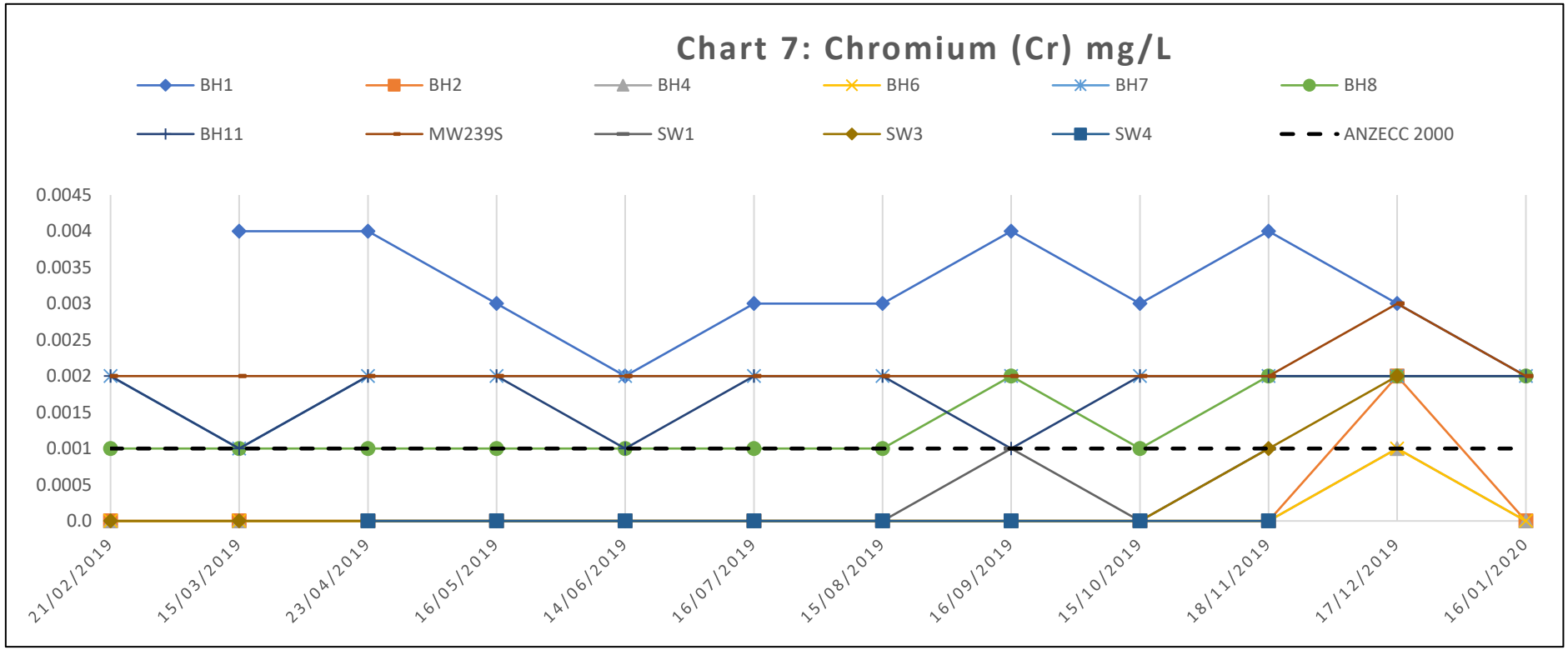


Chart 7: Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

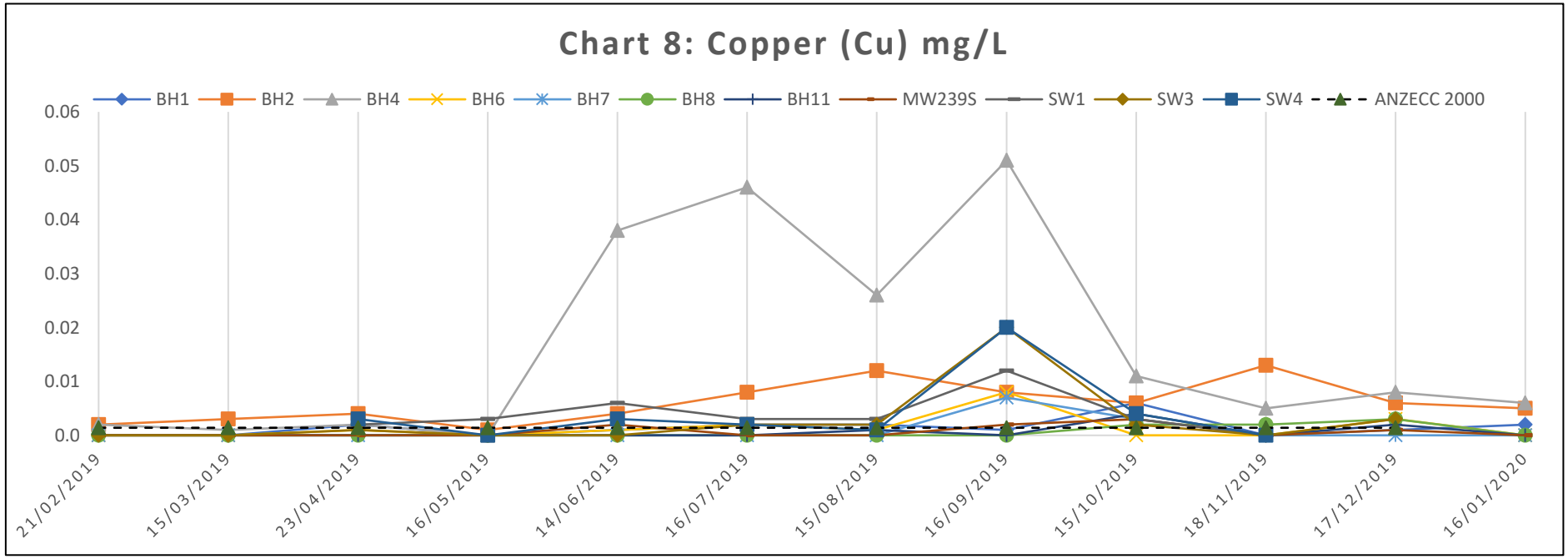


Chart 8: Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

Chart 9: Manganese (Mn) mg/L

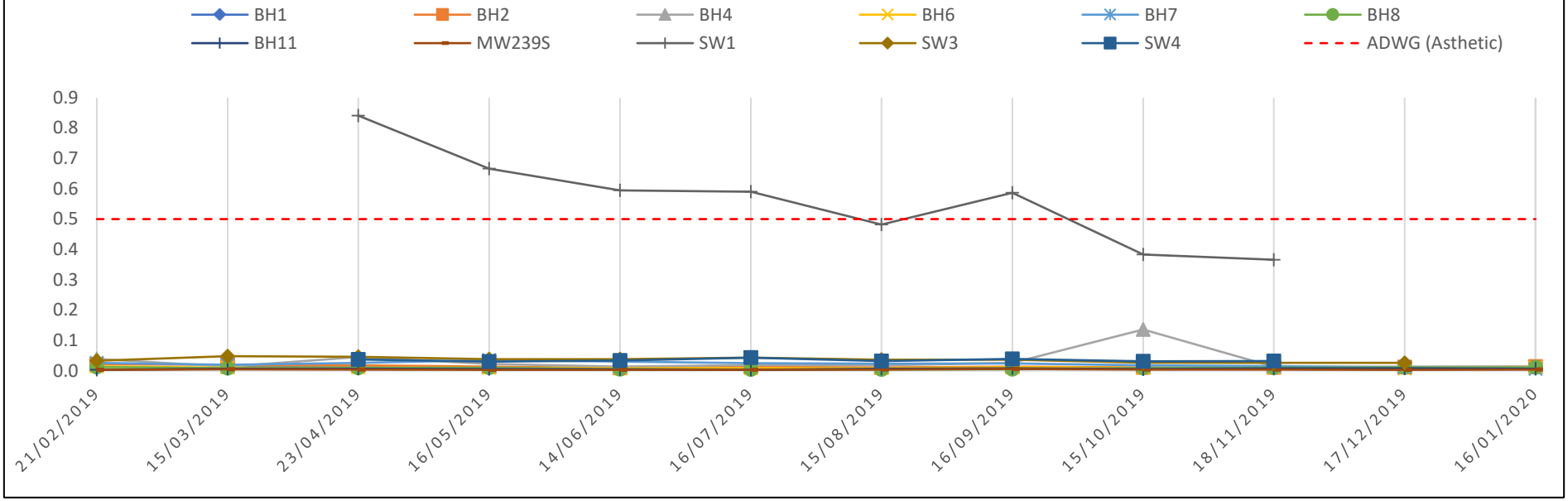


Chart: 10 Total Hardness ($CaCo_3$) mg/L

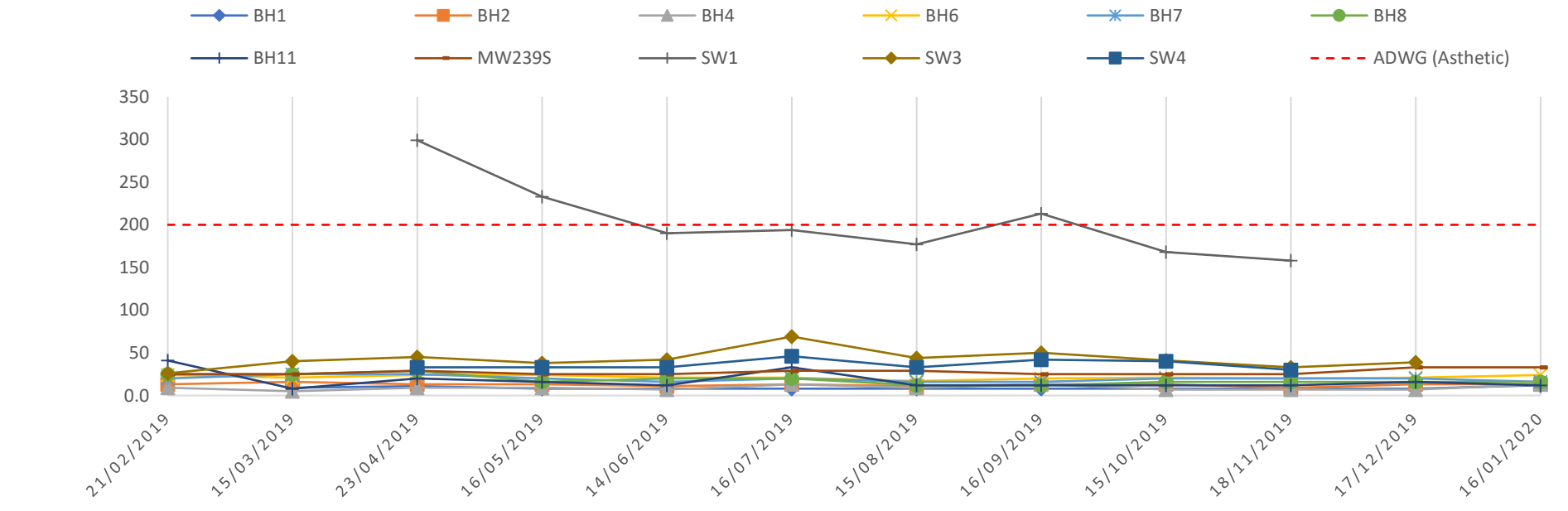


Chart 11: Total Dissolved Solids (TDS) mg/L

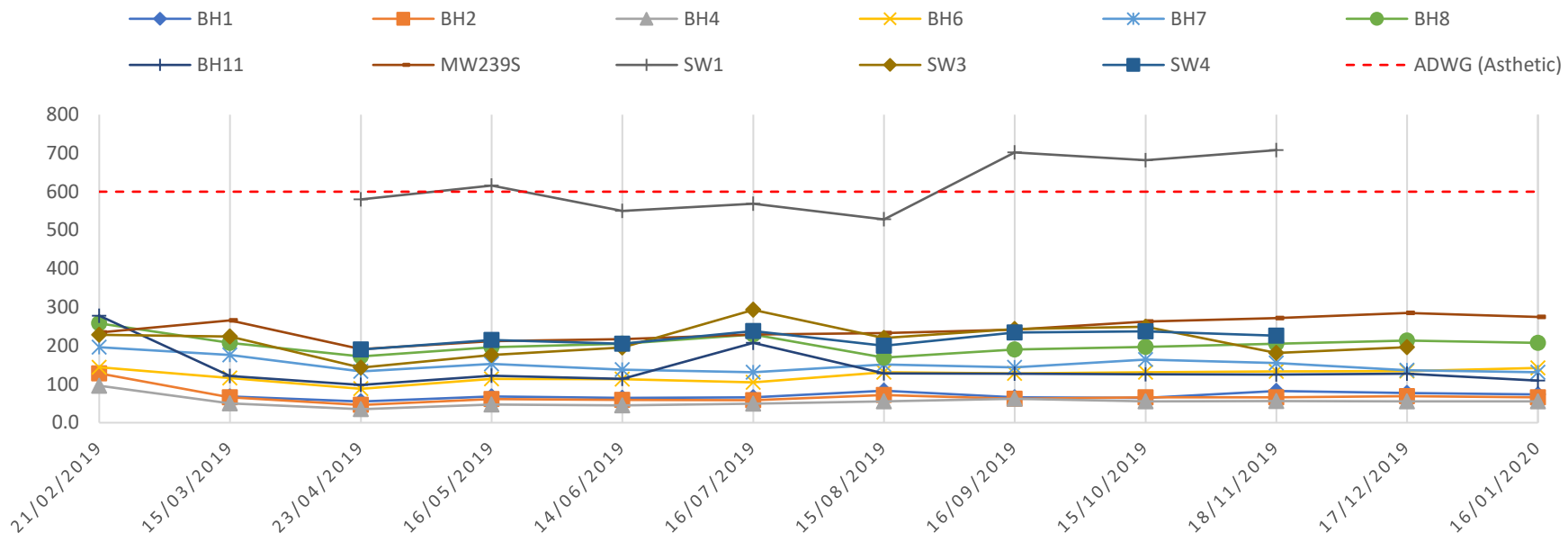


Chart 12: Sodium(Na) mg/L

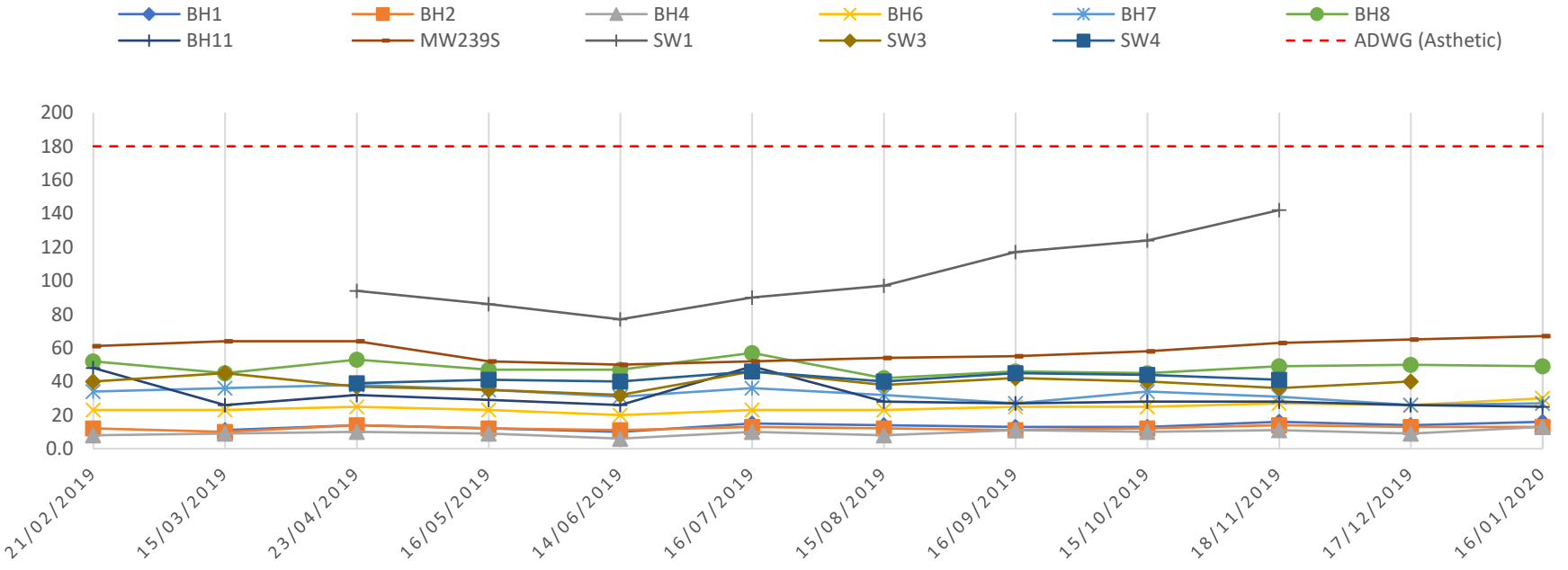


Chart 13: Calcium(Ca) mg/L

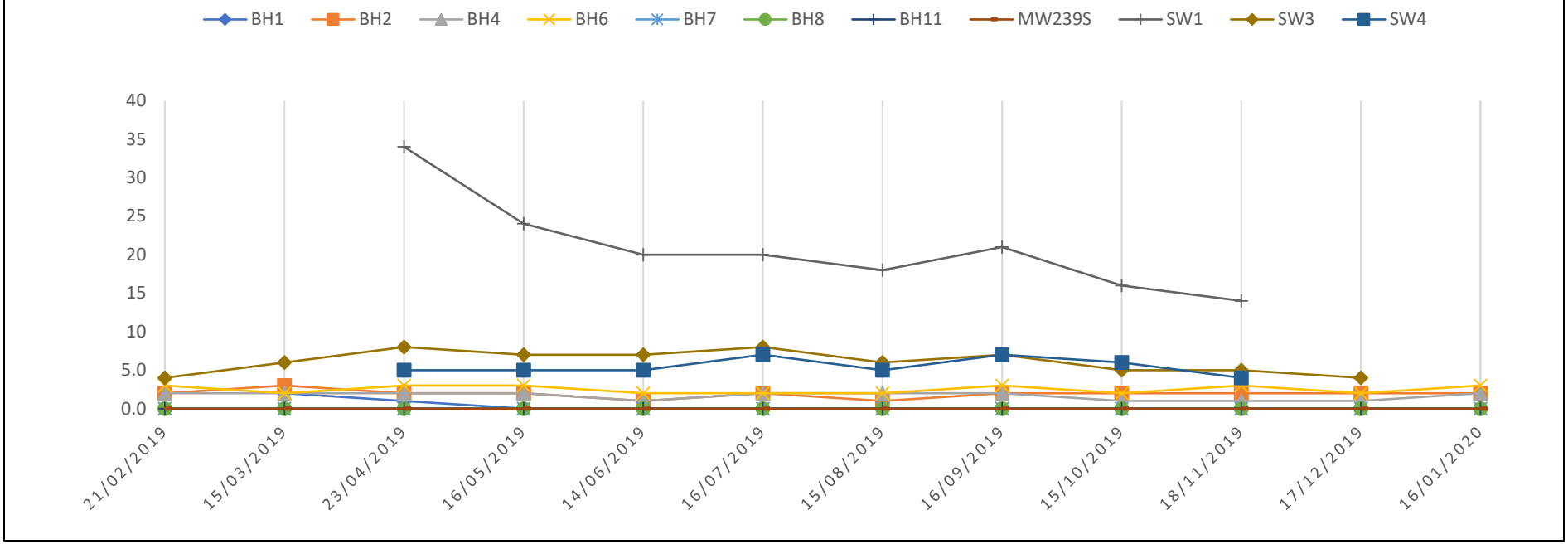
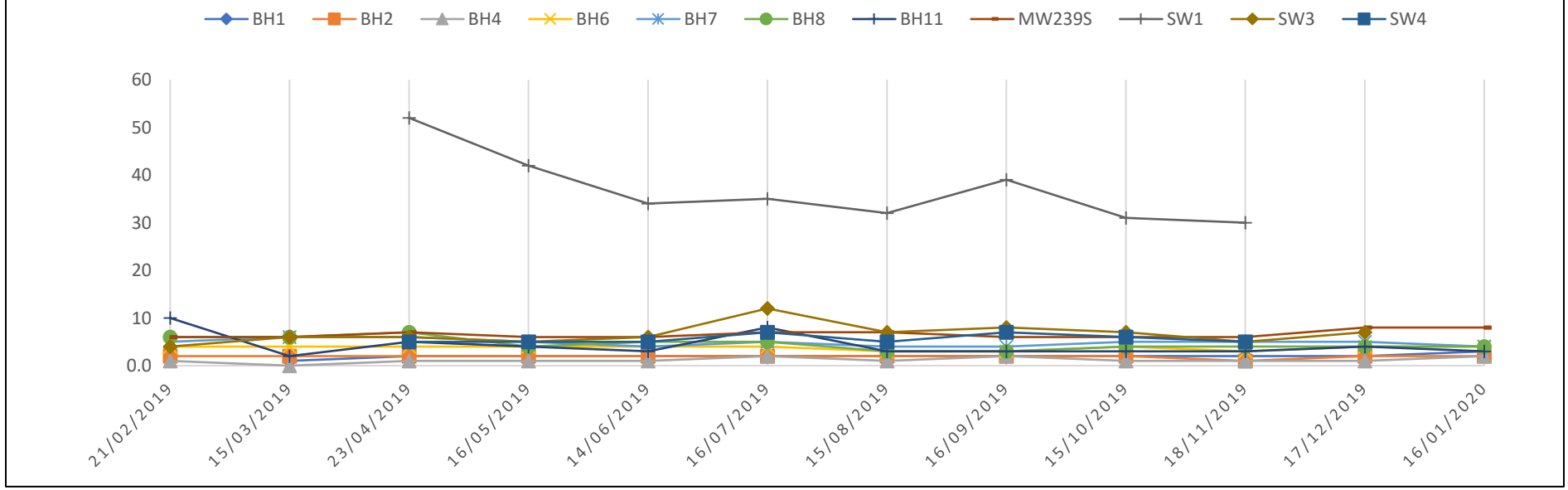


Chart 14: Magnesium(Mg) mg/L



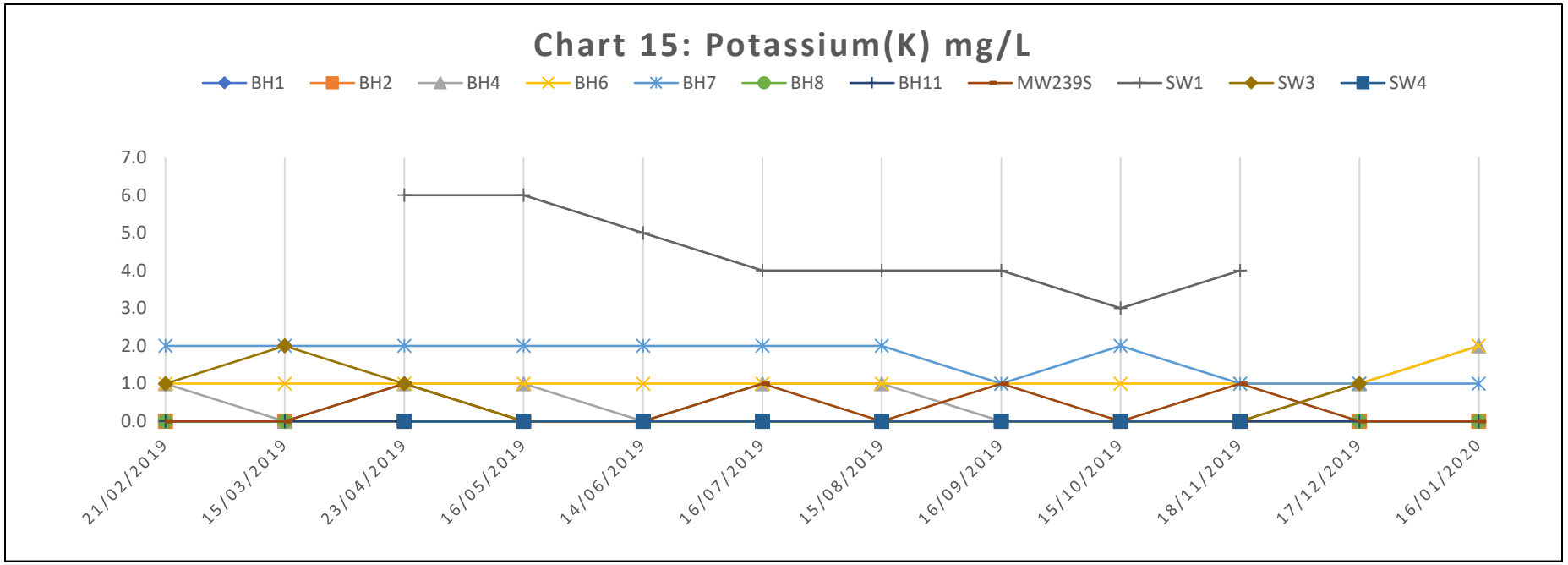


Chart 15: Potassium(K) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

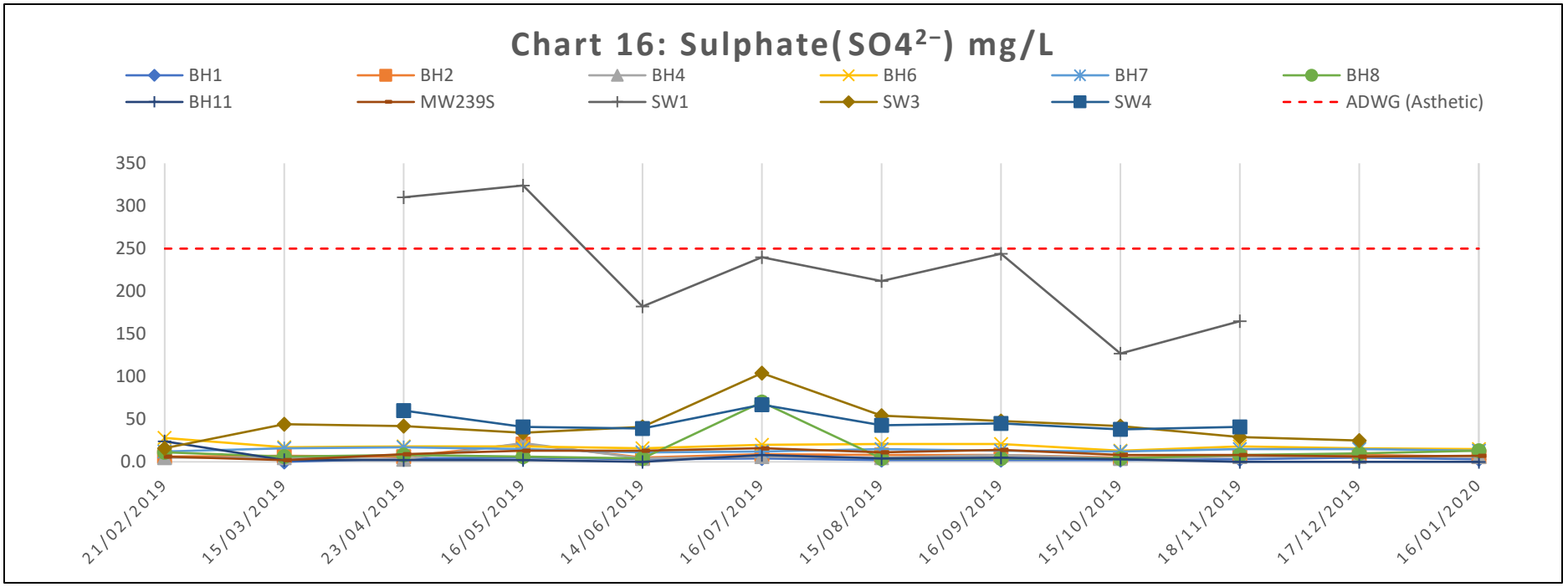


Chart 16: Sulphate($SO4^{2-}$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

Chart 17: Chloride (Cl) mg/L

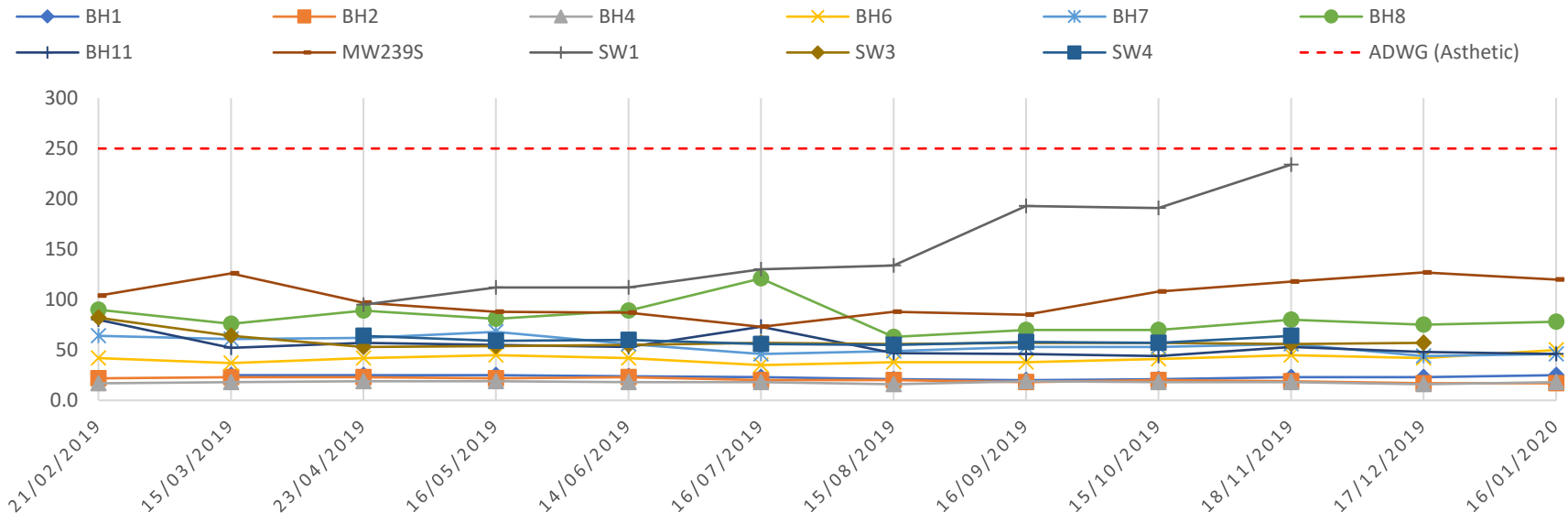
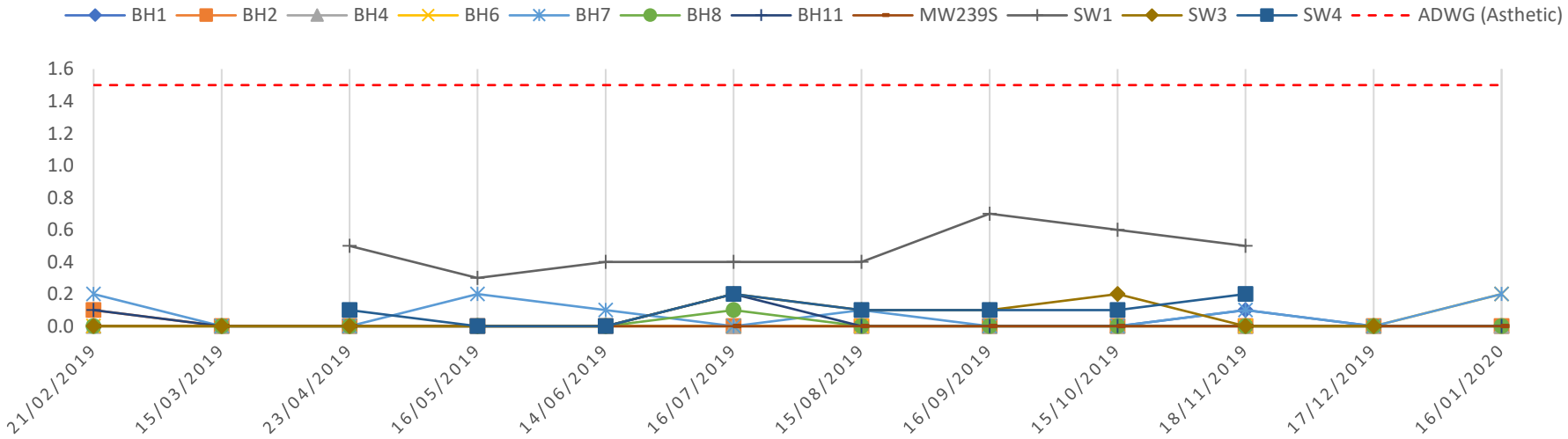


Chart 18: Fluoride (F^-) mg/L



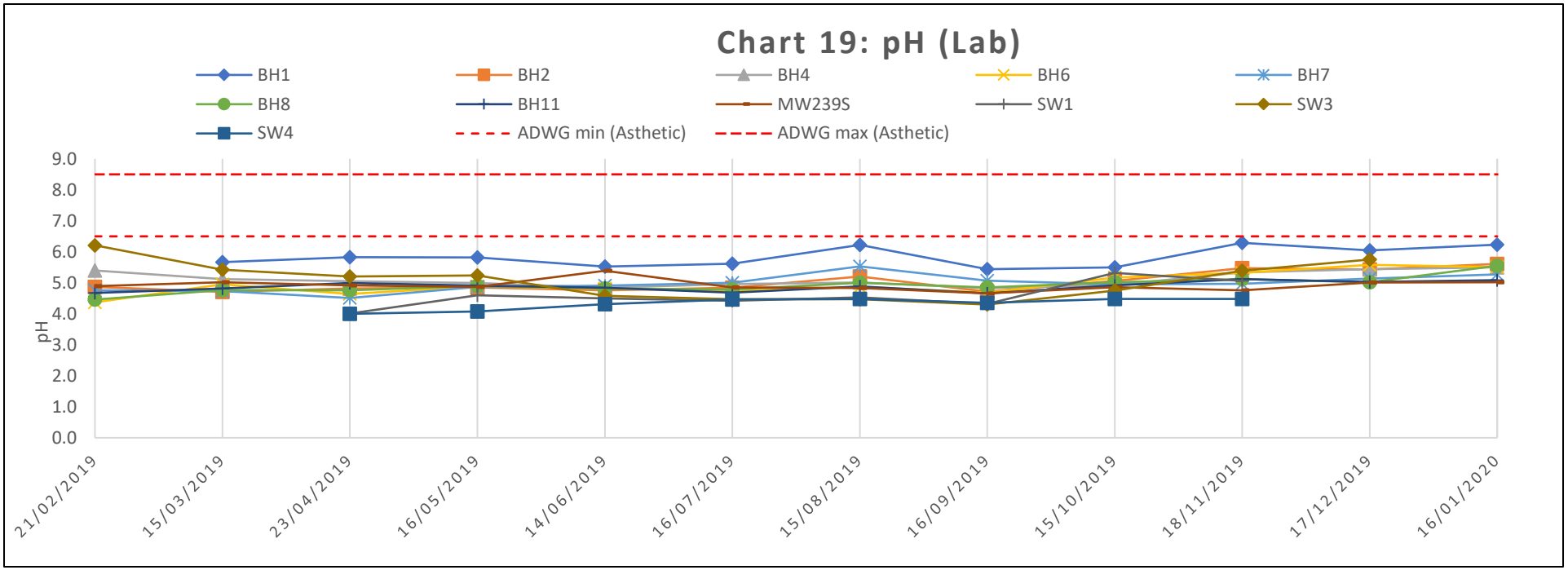


Chart 19: pH (Lab)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
pH
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

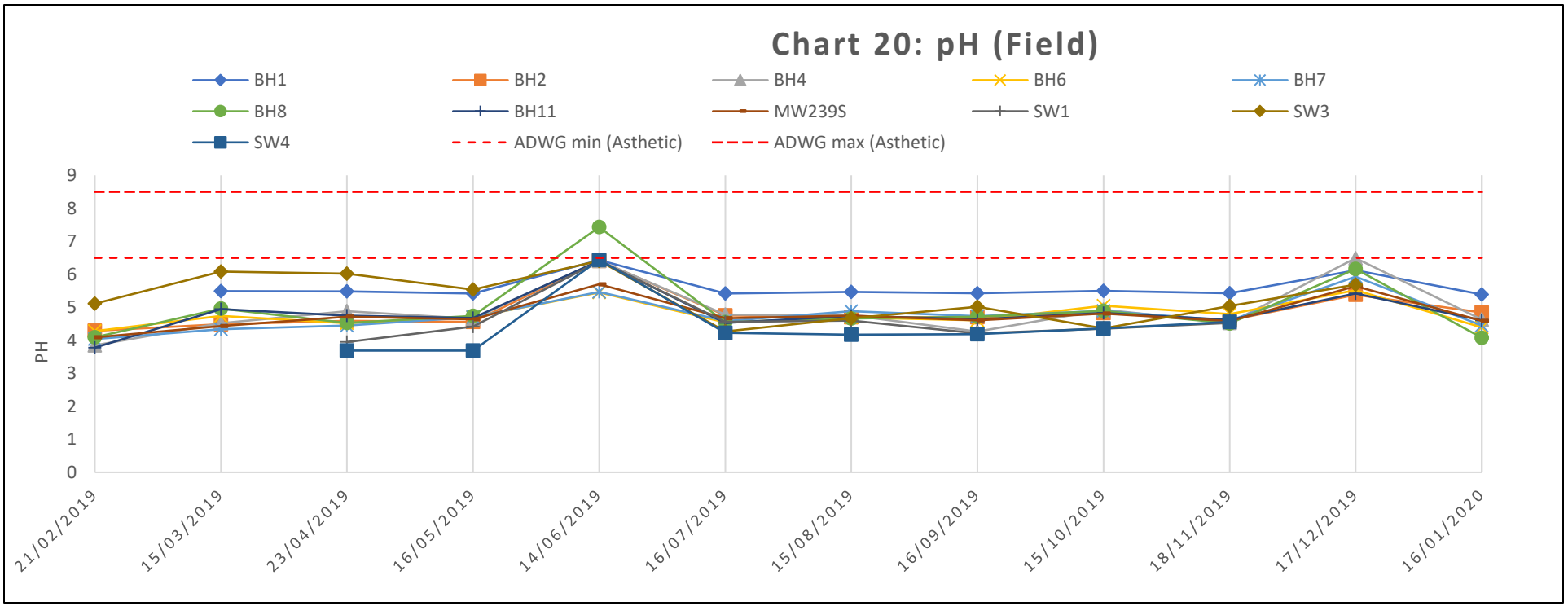


Chart 20: pH (Field)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
PH
9
8
7
6
5
4
3
2
1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

APPENDIX A: FIELD SHEETS AND CALIBRATION CERTIFICATES

Copyright 2020 Kleinfelder

ECO Environmental

Environmental monitoring
& sampling equipment
Rentals and sales.

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www.ecoenvironmental.com.au
Unit 2B, 6 Edmondstone Road, Bowen Hills QLD 4006

Interface Probe – Calibration Certificate

Instrument: **Heron Interface Probe – 100m**
Serial No: **HIM100-1B**

Items			
Items	**Id No.**	**Sent**	**Returned**
Interface Meter	HIM100-1B	X	
Manual	N/A	X	
Spare Batteries	N/A	X	
Carry Case	N/A	X	

Calibration Results		
Parameter	**Standard**	**Result**
Water	Tap Water	Pass
Oil	Kerosene	Pass
Battery	9 Volts	9.00 Volts

Date: 28.02.2019

Calibrated by: _____

Multi Parameter Water Meter

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Instrument **YSI Quatro Pro Plus**
Serial No. **18L101819**

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		324189	pH 9.77
2. pH 7.00		pH 7.00		330737	pH 6.99
3. pH 4.00		pH 4.00		330734	pH 4.09
4. mV		227.4mV		338782/337308	226.6mV
5. EC		2.76mS		333787	2.74mS
6. D.O		0.00ppm		329994	0.03ppm
7. Temp		22.6°C		MultiTherm	22.5°C

Calibrated by: **Sarah Lian**

Calibration date: **7/02/2020**

Next calibration due: **8/03/2020**

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829** - 2B

Serial No: B0050676

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			Available on request
Spare Batteries	✓		

Sensor Calibration Details

	Calibration Undertaken		Accuracy	Pass	Fail
Temperature	23.40		± 0.2 °C	✓	
Dissolved Oxygen	100%		± 0.2%	✓	
	0%		± 0.2%	✓	
pH	pH 4.00		± 0.2%	✓	
	pH 7.00		± 0.2%	✓	
	pH 10.00		± 0.2%	✓	
ORP	235.6	mV @ 22°C	± 30 mV	✓	
Turbidity	0 NTU		± 5.0 NTU	✓	
	20 NTU		± 5.0 NTU	✓	
	200 NTU		± 20.0 NTU	✓	
Conductivity	1.413mS/cm		±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Joseph Feltham

Equipment Specialist
ECO Environmental Holdings

13-May-2019

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ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829 -** 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			
Spare Batteries	✓		

Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		25.25°C	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	229	mV @ 29	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		1.413mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Geremy Kil

Equipment Specialist
ECO Environmental Holdings

11-Jun-2019

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ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829** - 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			
Spare Batteries	✓		

Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		25°C	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	233.4	mV @ 23	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		1.413mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Geremy Kil

Equipment Specialist
ECO Environmental Holdings

16-Apr-2019

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Turbidity Meter

Instrument **DKK TOA TURBIDITY METER**
Serial No. **737757**

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor			
	1. Turbidity	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1.Turbidity		360 NTU Solution		306028	364 NTU

Calibrated by: **Sen Philip**

Calibration date: **12/07/2019**

Next calibration due: **11/08/2019**

ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829 -** 4B

Serial No: B0060782

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			
Spare Batteries	✓		

Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		21.6	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	235.6	mV @ 22	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		12.90mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Geremy Kil

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ECO Environmental Holdings

13-Sep-2019

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ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829 -** 1B

Serial No: B0022987

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			Available on request
Spare Batteries	✓		

Sensor Calibration Details

	Calibration Undertaken		Accuracy	Pass	Fail
Temperature		24.15	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	231.2	mV @ 24	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		12.90mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Joseph Feltham

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12-Nov-2019

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ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829 -** 2B

Serial No: B0050676

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			
Spare Batteries	✓		

Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		26.20°C	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	226.8	mV @ 26	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		12.90mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Geremy Kil

Equipment Specialist
ECO Environmental Holdings

12-Dec-2019

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ECO Environmental

Equipment Information / Calibration Certificate

Instrument: **Hanna HI9829 -** 1B

Serial No: B0022987

Equipment Check	Enclosed	Returned	Comment
WQM	✓		
Manual	✓		
Probe Cluster	✓		
In situ monitoring cage	✓		
Calibration cup	✓		
Flow through Cell			Available on request
Spare Batteries	✓		

Sensor Calibration Details

		Calibration Undertaken	Accuracy	Pass	Fail
Temperature		25.20	± 0.2 °C	✓	
Dissolved Oxygen		100%	± 0.2%	✓	
		0%	± 0.2%	✓	
pH		pH 4.00	± 0.2%	✓	
		pH 7.00	± 0.2%	✓	
		pH 10.00	± 0.2%	✓	
ORP	229	mV @ 25	± 30 mV	✓	
Turbidity		0 NTU	± 5.0 NTU	✓	
		20 NTU	± 5.0 NTU	✓	
		200 NTU	± 20.0 NTU	✓	
Conductivity		12.90mS/cm	±0.5%	✓	

This is to certify that where possible, this instrument has been calibrated in accordance with the manufacturer's calibration procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Geremy Kil

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ECO Environmental Holdings

14-Jan-2020

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KLEINFELDER
Bright People. Right Solutions.

BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

			Field Measurements							
Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria[1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen.
BH08 1330	2.760	[redacted]	21.8		0.411 mS/cm		4.09	121	Sulfur Smell - Dark brown
BH4 1420			20.4		On 129.2 uS/cm		3.85	135	Light Discolouration
BH3 1440			22.1		82.4 uS/cm		4.54	96	Light Brown
BH12 1500			22.7		157.2 uS/cm		2.82	138	Dark Brown No odour
BH11 1530			22.3		0.402 mS/cm		3.78	136	Brown No odour
MW23S 0720			21.7		326 uS/cm		4.09	121	Light Brown Slight Sulfur odour
BH5 0830			20.1		370 uS/cm		4.06	122	Roots evident - Brown Slight Sulfur odour
BH6 0850			23.1		0.228 mS/cm		4.28	111	Clear to Slightly Cloudy No Odour
BH7 0920			23.7		0.283 mS/cm		4.04	125	Slightly Cloudy/Light Brown ~~No odour~~ Slight Sulfur smell
BH2 1030			22.7		124.1 uS/cm		4.29	111	Oil Sheen
SW3 1615			26.0		0.313 mS/cm		5.11	62	Water level low Slight Sulfur Odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority; *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	14/3	DK		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

14/3

Field Measurements

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	DTW	ORP mV	NTU	Description
Stabilisation Criteria[1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV				Odour, sediment load, colour, sheen
BH8 1300			21.54	4.56	0.307mS/cm	0.199g/L	4.96	132	176	785		Cloudy → Sulphur Odour
BH7 1330			25.0	2.28	0.251mS/cm	0.162g/L	4.34	141	179	458		Brown → Sulphur odour
BH6 1415			23.17	3.86	0.159mS/cm	0.163	4.74	121	178	332		Brown No Odour
MW23S 1445			23.1	3.95	0.323mS/cm	0.215	4.43	136	179	362		Dark brown → Slight odour
SW9 1515			25.87	0.72	0.342mS/cm	0.222	6.08	52	10	358		Very small section of Pinster
#15/3												
BH11 0745			18.87	4.72	0.168mS/cm	0.108	4.95	109	176	565		Light Brown → Slight odour
BH1 0830			18.93	4.14	0.111mS/cm	0.076	5.49	81	180	450		Light Brown → Slight Acetic Smell
BH2 0915			19.35	4.01	0.101	0.066	4.49	132	264	389		Dark Brown No odour
BH4 0950			18.92	3.97	0.079	0.051	4.52	190	311	611		Light Brown / No odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
		DK		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Turbidity FNU — Salinity PSU

Field Measurements											
Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)		EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description	
Stabilisation Criteria [1]				mg/L +/- 10% or 30		+/- 3%	+/- 3% TDS	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen	
1115	Surface	5.2	17.57	1.54	16.3	339	169	3.69	430.5	Clear → No Apparent odour	0.16
1190	Surface	75	23.16	2.33	27	1003	502	3.95	[illegible]	Small cloudy pool of water	0.5
1210		301	21.43	[illegible]	[illegible]	43.	22	4.88	[illegible]	Cloudy No odour	
1245		>1000	[illegible]	[illegible]	85.7	87	43	4.59	[illegible]	Dark Brown → Black, No odour	0.04
1315		453	21.41	1.92	23	87	44	5.48	91.4	Slightly Cloudy No Apparent odour	0.04
1345		533	21.64	1.87	21.6	155	78	4.75	78.3	Cloudy Slight sulfur smell	0.07
1430		86.1	19.88	0.58	6.5	311	155	6.02	-12.8	Slightly cloudy No odour	0.15
1445.		>1000	21.43	1.82	20.3	852	176	4.72	45.3	Cloudy Sulfur odour	0.17
1510		143	22.09	1.95	22.8	144	72	4.52	140.1	Slightly Cloudy - Slight sulfur odour	0.07
1530		131	22.9	2.97	38.3	293	117	4.45	94.3	" " " "	0.11
1600		>1000	20.66	2.28	25.9	300	150	4.53	17.6	" " "	0.14
										Field Parameters	
										Very Cloudy	

23/4 SW4 SW1 BH4 BH2 BH1 BH5 SW3 MW23S BH6 BH7 BH8

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	16/5/19	DK.		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Turbidity (FNU)

	Field Measurements									
	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
	Stabilisation Criteria (1)				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
SW4	1030		0.5.	12.03.	1.94	389	188	3.69	211.4	Clear - No Odour
SW1	1115		24	14.9	1.89	966	483	4.42	106.7	Stained Brown - Tanning
~~BH3~~ BH4	1145		378	20.14	2.09	110	55.	4.65	98.5.	Stained Brown - Tanning.
BH2	1206		>1006	21.13	1.44	124	62	4.56	111	Dark Brown No Odour
BH1	1220		205.	20.57.	1.86.	150	75.	5.42	25.6	Very light Brown - No Odour
BH11	1245		348	19.94.	1.55	232	116	4.68	-71.5	light Brown - No odour
SW2	1315		29.9	14.54	2.06	344	171	5.54	71.6	Slight Discolorisation - No odour
MW23S	1345		782	19.49.	1.17	392.	196	4.64	-65.8	Dark Brown Sulfur Smell
BH6	1415		92.7	20.62.	1.59	226	113.	4.70	-5.2	light Brown / No Odour
BH7	1445		167	20.86	1.17	298	149	4.74	-75	light Brown / No odour
BH8	1500		379	19.48.	1.39	360	180	4.75	-64	Brown / Sulfur Odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
(1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 668, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	14/6/19	DH		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(____ - ____) x 5 = ____ L Minimum volume to be purged (3xBV)*: ____ L
TD (m) - DTW (m) 1 BV

Turbidity (FNU)

	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
	Stabilisation Criteria [1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
SW4	10.45		1.4	13.34	~~2.07~~ ~~2.10~~	313	157	6.44	~~297.3~~ ~~297.4~~	Light brown, no odour
SW1	11.40		9.2	14.50	1.42	811	407	6.40	298.4	Dark brown, no odour, slight sheen
BH4	N/S		~~Bailed~~	19.01	3.08	55	28	6.41	321.9	mildly cloudy, no odour
BH2	12.15		>1000	20.84	2.57	77	39	6.41	255	V. cloudy, dk brown, no odour
BH1	12.50		174	19.97	1.85	111	56	6.43	33.6	clear, no odour
BH11	12.50		504	18.93	2.73	185	93	6.41	-78.5	cloudy with sulfur odour
SW3	7.90		6.9	16.50	2.12	290	144	6.41	52.4	clear, no odour
MW239S	13.50		192	19.30	~~3.67~~	305	153	5.70	-107.9	cloudy, sulfur odour
BH6	2.10		91.4	19.73	1.87	176	89	5.45	-164.7	~~clear~~ cloudy, slight sulphur odour
BH7	2.30		81.5	19.56	10.34	217	109	5.47	-227.9	slight cloud, sulfur odour
BH8	2.40		>1000	18.78	1.73	289	145	7.43	-340.8	dk brown cloudy, sulfur odour

COMMENTS: _____

*inimum volume to be purged except where wells are dry.
parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
dian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	USS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	16/7	CY/IC.		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

NTU mS/cm Field Measurements

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria [1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen.
SW4 0930		3·8	9·9	~~xx~~	0·371mS	~~xx~~	4·23	116	No Odour, light Tan.
BH4 1100		155	17·6	~~xx~~	915µS		4·78	88	cloudy No odour
SW1 1105		11·9	9·7	~~xx~~	0·827mS		4·56	99	Dark Tan. No odour
BH2 1130		>880	18·3		124·5µS		4·76.	88	Dark, Cloudy No odour
BH1 1145		358	18·4		122·1µS		5.42	51	Slightly Cloudy No odour
BH11 1215		>880	16·9		0·296mS		4·53	101	Cloudy No odour
SW3 1245		13·9	14·6		0·431mS		4·27	116	Clear -> No odour
~~DUP~~ SW2SS 1315		811	15·8		0·37mS		4·67	94	Cloudy Slight Sulfur Smell
BH6 1330		108	17·2		0·191mS		4·54	101	Slightly Cloudy - No odour
BH7 1400		248	17·2		0·228mS		4·58·	100	Slightly cloudy - Slight Sulfur
BH8 1420		>880	16·8		0·347mS		4·55	101	Cloudy Brown - Sulfur odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS - Cab Tree Rd		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	15/8	DK		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Turbidity FNU

	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
	Stabilisation Criteria [1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour; sediment load; colour; sheen
SW4	0950		44	8.07	3.84	485	249	4.17	294	Clear No odour
SW1	1045		8.7	9.52	2.82	1205	602	4.6	269	Stained Tannin → Sulfur odour
BH4	1100		400	17.96	4.8	102	51	4.76	266	Slightly cloudy
BH2	1120		>1000	19.66	4.0	136	68	4.7	275	Silty Base → Dark brown - No odour
BH1	1145		136	19.69	2.8	165	83	5.47	103	Slight cloudy + Slight Sulfur odour
BH11	1215		842	17.66	2.6	261	130	4.74	126	Cloudy light Brown - Sulfur odour
SW3	1245		23	11.96	2.7	464	232	4.67	152	Clear → No odour
MW23S	1300		>1000	17.99	2.46	530	265	4.75	72.8	Dark Brown → Strong Sulfur odour
BH6	1330		98	18.32	2.55	277	139	4.69	140	Slight Sulfur odour, Slight Brown colour
BH7	1345		305	17.71	2.1	329	164	4.88	55	Cloudy Brown → Sulfur odour
BH8	1415		>1000	18.20	1.05	374	187	4.66	29	Cloudy Brown → Sulfur odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within those levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	16/9	DK.		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

FAIU

Field Measurements

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria (1)				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen.
SW4 1090	-	<0	14.8	3.63	371	186	4.79	360	Clear → No odour
BH2 1100	-	>1000	21.61	5.1	111	55	4.7	265	Dark Brown Sulfur
BH1 1130	-	537	21.02	5.2	125	62	5.43	101	Slightly Brown Cloudy → No odour
BH11 1200		>1000	20.26	5.09	195	97	4.64	312	Cloudy Brown / slight
BH4 1245		386	20.53	5.18	96	48	4.27	251	Clear / No odour
SW1 1300		25.2	16.59	2.48	1138	569	4.21	323	Dark brown Tannin
BH8 1330		>1000	18.64	5.26	300	156	4.72	-10	Dark Brown / Sulfur odour
BH7 1405		181	16.34	4.95	232	116	4.73	-22	light Brown / Sulfur odour
MW295 1430		885	17.56	5.35	397	198	4.61	-11	Cloudy Brown / Sulfur odour
SW3 1447		119	17.05	2.88	449	224	5.02	86.7	Clear / No odour
BH6 1505		69	16.66	3.03	215	107	4.61	57	Clear / Slight odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
(1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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GAUGING LOG

Project Number:	Site Name:	Site Address:
20190803.001A	DSS, Glenridge Road	

Date:	Field Manager:
21/2/19	TK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
07.45	MW08	50	—	—	2.780	—	6.08	good Condition. 3.2 metres.	
0800	BH7	50	—	—	1.938	—	4.42	Good Condition 2.7 metres	
0815	BH5	50	—	—	6.063	—	8.63	Root Band @ 2.6 metres	
0825	BH6	50	—	—	1.823	—	4.43	Good Condition 2.4 metres	
0831	MW23S	50	—	—	1.529	—	3.89	Good Condition 2.2m.	
0836	MW23D	50	—	—	1.512	—	20.21	Good Condition 18.8m.	
0850	BH12	50	—	—	Dry	—	6.166	Dry or Root Band	
0910	BH1	50	—	—	5.776	—	8.89	Top Well Melted 3.1m.	Top of Gotic
0930	BH10	50	—	—	Dry	—	3.58	Dry	
0945	BH11	50	—	—	3.620	—	5.21	Good Condition 2.2m.	
0957	BH2	50	—	—	5.674	—	8.93	Good Condition 3.3m.	Data logger Attached.
21/2 10.10	BH3	50	—	—	6.026	—	8.94	Good Condition 2.91m.	Data logger Attached
↑ 1035	BH9	50	—	—	Dry		5.82	Good Condition	Dry Data logger Attached
10.45	BH4	50	—	—	7.494	—	5.92	Good Condition	
↓ 22/2 10.30	BH2	50	—	—	5.674	—	8.93	Good Condition 3.7	Data Logger Attached

COMMENTS:

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:

Date:	Field Manager:
14-3-19	[redacted]

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0530	BH4	50	—	—	2.051	—	5.92	Good Condition	Data logger Attached
0700	BH9	50	—	—	Dry	—	16.01	Dry Soft Bail	
0919	BH3	50	—	—	6.146	—	8.35	Good Condition,	Can't lock properly
0925	BH2	50	—	—	5.184	—	8.93	Good Condition	Data logger Attached
0940	BH1	50	—	—	6.145	—	8.12	Well Reinstated - fresh concrete	Needs well cover/cap. Acrylic smell.
1005	BH10	50	—	—	Dry	—	3.58	Good Condition	
1015	BH11	50	—	—	3.181	—	5.21	Good Condition	Data logger Attached
1045	BH12	~~40~~ 50/40	—	—	6.924	—	8.03	Good Condition 40mm inner	Installed
1100	MW23S	50	—	—	1.615	—	3.84	Good Condition	Data logger Installed
1105	MW23D	50	—	—	1.591	—	20.19	Good Condition	
1120	BH5	50	—	—	6.146	—	8.69	Good Condition	
1130	BH6	50	—	—	1.913	—	4.44	Good Condition	
1145	BH7	50	—	—	2.015	—	4.42	Good Condition	
1150	BH8	50	—	—	2.864	—	6.04	Good Condition	

COMMENTS:

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
23/4/15	DH

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0715 ~~0844~~	BH4	50	–	–	1.878		6.02	Good Condition	Data logger Attached
0745	BH5	50	–	–	Dry		16.01	Well Dry	
0800	BH3	50	–	–	6.059		9.09	Good Condition	Data logger Attached - Silty material @ base
0815	BH2	50	–	–	5.839		9.02	Good Condition	Data logger
0830	BH1	50	–	–	6.277		8.21	Good Condition - Need End Cap	
0845	BH10	50	–	–	Dry		3.58	Good Cond.	
0910	BH11	50	–	–	3.254		5.29	Good Cond	Data logger
0930	BH12	50/40	–	–	6.846		8.12	Good Condition	Acrilic Smell - 40mm PVC Inner
0945	MW2359	50	–	–	1.392		20.20	Good Condition	
0950	MW2395	50	–	–	1.421		3.89	Good Condition	
1010	BH5	50	–	–	5.914		8.71	Good Condition	Slight Sulfur Smell
1020	BH6	50	–	–	1.761		4.52	" "	" "
1030	BH7	50	–	–	1.744		4.51	" "	Slight Sulfur Smell
1050	BH8	50	–	–	2.511		6.18	" "	" " "

COMMENTS:

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
16/5/19	DIC

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
BH4 0700	BH4				1.847			Good Condition	Data logger Downloaded
0715	BH9				Dry.			Well Dry	
0730	BH3				6.064			Good Condition/Water Silty	Data logger Downloaded
0745	BH2				5.86*			Good Condition	Data logger Downloaded
0800	BH1				6.319			Cap missing	
0815	DH10				Dry.			Well in Good Condition.	
0830	BH11				3.311			Well in Good Cond	Data logger Downloaded
0840	SW2				Dry				See Photos
0845	BH12				6.863			Well in Good Condition	Acrylic Smell from well.
0900	MW295D.				1.383			" " "	—
0910	MW395				1.412			" " "	Data logger Downloaded
0930	DH5				5.894			" "	
0945	DH6				1.766			" "	—
0950	BH7				1.716			" "	Solv. Smell.
1000	DH8				2.458			" "	Solv. Smell
1015	SW4				135mm			Clear water	See Photos.
1130	SW1				10mm			Moved To Centre of water	See Photos
1315	SW3				98mm				See photos

COMMENTS: _____

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
14/6	TKL

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0800	BH4				1.723			Good Condition	
0815	SW1				>140mm			Stained water from Boat Launch	No odour
0830	BH9				Dry			Good Condition	Well Dry
0845	BH3				6.605			Good Condition	Sediment @ Base
0850	BH2				5.852			" "	
0910	BH1				6.375			" No Cap.	
0920	BH11				3.382			Good Con	
0945	BH10				Dry			—	—
1000	BH12				6.832			Good Con	
1005	SW2				Dry			Dry / Good Con	
1010	MW390				1.320			" /	
1011	MW395				1.344			" "	
1015	BH5				5.823			" "	No Odour
1025	BH6				1.713			" "	" "
1036	BH7				1.634			" "	
1035	BH8				2.346			" "	"
	SW4				>175 mm			natural tannins staining.	no odour
1001	SW3				>150 mm.			Slightly Cloudy	No odour

COMMENTS: _____

NOTES:
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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
16/7	JK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0715	BH4.				4.617				
0730	BH5				Dry				
0740	BH3				5.938			GC - Some Silty Material	
0750	BH2				5.803			GC.	
0800	BH1				6.373			GC	
0815	BH10				Dry			GC	
0830	BH11				3.348			GC - Some Root Evident	
0845	BH12.				6.799			GC - 40mm Inner - Acrylic Smell,	
0850	MW23SD				1.239			GC Sulfur odour	
0855	MW23SS				1.262			GC. Sulfur Odour	
0900.	BH5				5.779			GC.	
0905	BH6				1.591			GC Sulfur odour	
0910	BH7				1.544			GC Sulfur Odour	
0920	BH8				2.266			GC.	
0930	SW4.				<265mm	above		Clear water	
1255	SW3				<215	above		Clear / No odour	
	SW2							Dry	
	SW1		See Photo.					Clear.	

COMMENTS: _____

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSJ Cobalt	

Date:	Field Manager:
15/8	JC

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0740	BH4				1.736				
0745	SW1							See Photo	
0756	BH9				Dry				
0800	BH2				5.888				
0805	BH1				6.453				
0810	BH10				Dry				
0825	BH11				3.503				
0840	BH12				6.859				
0845	MW23897D				1.327				
0850	MW23895				1.352			Probe Pinched in Well → Not submerged.	Monthly Data will be out
0859	BH5				5.894				
0906	BH6				1.723				
0915	BH7				1.649				
0920	BH8				2.406				
0921	SW2				Dry				
0945	SW4							See Photo	
1010	DH3				6.027				
1245	SW3				> 1.9m			See Photo	

COMMENTS: _____

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
16/9	DK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0790	BH4	50			1.604		6.11	GC.	
0745	SW1	50					—	See Photo.	Slight Odour - Tannin
0800	BH5	50			Dry		5.89	Dry GC	
0802	BH2	50			5.796		9.08	GC.	
0820	BH1				6.428		8.28	GC - No Cap	
0840	BH11				3.546		5.39	GC	
0856	BH10				Dry		3.58	GC	
0905	BH12.				6.827		8.2	GC.	
0900	SW2				Dry		—		
0915	MW23S				1.269			GC	
0917	MW23D				1.248			GC	
0930	BH5				5.766			GC	
0945	BH6				1.647		4.62	GC.	
0950	BH7				1.542		4.61	GC.	
1000	BH8				2.282		6.27	GC.	Slight Odour -> Silty Base.
1030	SW4							See Photo	Clear.
1445	SW3				150			See Photo	Clear
1515	BH9								

COMMENTS: _____

NOTES:
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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
25/4	DIC

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0730	BH4				1.435				
0845	SW1							See Photo	
0815	SW4							See Photo	
0830	BH8				2.092			GC	
0835	DH7				1.408			GC	
0845	BH5				5.648			GC	
0850	DH6				1.499			GC	
0855	MW23D				1.139			GC	
0856	MW23S				1.159			GC	
0905	SW3				20cm			Elect /	
0915	BH12				6.732			Acetic Odour	
0920	DH1				6.413				
0930	DH10				D.Y				
0935	BH11				3.504			GC.	
0950	BH2				5.740			GC.	
1000	BH9				D.Y				
~~1045~~	~~DH4~~								

COMMENTS:

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Cas...
* = If PSH is gauged as present, visually confirm pres... ...of the PSH.

BH 5.45

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GAUGING LOG

Project Number:	Site Name:	Site Address:
20143820	WSS	

Date:	Field Manager:
15/10/14	DK

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0700	BH4				1.531		6.11		
0715	SW1							See Photo.	
0720	SW4				0.350			See Photo	
0740	BH3				Dry				
0750	BH2				5.769		9.03		
0755	BH1				6.427		8.30		
0810	BH811				3.586	Sheen.	5.4		
0815	SW2				Dry			Dry.	
0830	BH12				6.581				
0845	MW2SD				1.226		20.32		
0848	MW2SS				1.248		4.06		
0900	BH5				5.767		8.8'		
0905	BH6				1.628		4.62		
0910	BH7				1.514		4.61		
0920	BH8				2.233		6.28		

COMMENTS: _____

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
20193820	WSS	

Date:	Field Manager:
17/11/19	

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0745	SW1	-	-	-	0.02mAG	-	-	Dramatic Drop in water level	
0945	SW3.	-	-	-	0.02mAG	-	-	" "	
1045	SW4	-	-	-	0.15mAG	-	-	" "	
1010	BH4.	50mm	NA	NA	1.624				
1210	BH7				1.588				
1290	BH6.				1.657				
1245	MW2995				1.256.				
1330	BH2				5.721				
1490	BH1				6.432.				
1500	DH11				3.621				
1505	BH8				2.912.				
	SW2				Dry.				
	DH9				Dry				
	BH10				Dry.				
	BH5				5.752				
	BH12				6.890				
	MW2998				1.238				

COMMENTS: _____

NOTES:
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mBTOC = Metres Below Top of PVC Casing
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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSI	

Date:	Field Manager:
17/12	JL

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0830	BH4				2.051			GC	No Sheen Clear
0900	SW1				Dry				
0915	BH2				5.936			GC	Clear
0926	BH1				6.558				
0815	BH9				Dry				
0845	BH10				Dry				
0940	BH11				3.859				
0930	BH12				7.076				
1000	SW3				Dry as Marker				
1020	MW2901				1.626				
1025	MW2895				1.645				
1030	BH5				6.143				
1040	BH6				2.009				
1050	BH7				1.989				
1055	BH8				2.778				

COMMENTS: _____

NOTES:
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mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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GAUGING LOG

Project Number:	Site Name:	Site Address:
	WSS	

Date:	Field Manager:
16/1	OIL

Time	Monitoring Well ID	Well Diameter (mm)	PID Reading (ppm)	Depth to PSH* (mBTOC)	Depth to Water (mBTOC)	PSH Thickness (m)	Well Total Depth (mBTOC)	Detailed Description of Well Condition & Any Repairs Required	Comments: HC Sheen, PSH Appearance & Thickness, Odour, Water Appearance
0805	[redacted]	50	–	–	2.252	–		GC	
0835	[redacted]	50	–	–	6.153	–		GC	
0850	[redacted]	50	–	–	6.701	–		GC.	
0855	[redacted]	50	–	–	Dry	–		Dry	
0840	[redacted]	50	–	–	Dry	–		Dry	
0900	[redacted]	[redacted]	–	–	3.962	–		GC.	
0920	[redacted]		–	–	7.252	–		GC. -Slight Acetic odour	
0940	[redacted]		–	–	1.799	–		GC	
0945	[redacted]		–	–	1.823	–		GC	
0950	[redacted]		–	–	6.315	–		GC.	
0952	SW1				Dry			–	
0958	SW2				Dry			–	
1010	SW3				Dry			–	
1015	BH6				2.169			GC.	
1020	BH7				2.169			GC.	
1025	BH8				2.964			GC.	

COMMENTS: _____

NOTES:
TOC = Top of PVC Casing
mBTOC = Metres Below Top of PVC Casing
* = If PSH is gauged as present, visually confirm presence and thickness using a bailer. Record detailed description of the PSH.

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	25/9	DK.	Clear	

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Field Measurements

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria[1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
SW1 0745			13.7		~~1008~~ 1018	~	5.45	51	Tea Natural Tanin Plant - No odour ✓
SW4 0815			13.4		418		4.85	108	
BH4 1015			16.2		128		4.76	86	Slight cloudiness -> No odour -> No sheen

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	15/10/19	DK.	Clear	

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Tuth ENV

Wells to

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen.
SW4 0945	-	0	16.45	3.84	325	163 146.	4.36	370	Clear No Odour
DH4 1030		180	19.18	1.48	8	4	4.93	221	Slight Sulfur Odour - Brown cloudiness
SW1 1045		305	16.56	0.71	557	429	4.35	339	Sulfur odour - Dark Brown
BH2 1115	-	581	20.76	1.08	48	24	4.83	223	Dark Brown - Sulfur odour
BH1 1140		295	21.12	0.93	18	9	5.5	78	Slight cloudy Brown - Slight sulfur odour
BH11 1205		509	19.93	1.15	124	62	4.89	-117	Slightly cloudy Brown - Sulfur odour
SW3 1230		0	18.77	0.77	313	156.	4.96	315	Clear - No odour
MW23D 1300		340	20.87.	1.13	331	165	4.81	-133	cloudy Brown - Sulfur
BH6 1330		109	21.69.	1.69	110	55	5.05	-144	Slightly cloudy Brown - Sulfur odour
BH7 1350		119	21.79.	1.25	183	92	4.89	-138	" " " "
BH8 1415		861	20.44	1.19	224	112	4.89	-160	Dark Brown, Sulfur odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
(1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
20193820	WSJ		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	17/11/19	DK.		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
	Stabilisation Criteria [1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
SW3	0945			19.54	1.4	470	235	5.04	97.7	Red Algae present
SW4	1045			18.46	0.09	538	269	4.56	218.5	Clear - No odour (1) Dup SW4
BH4	1010			21.07	0.26	95	47	4.53	290	Slight Cloudy Brown + odour
SW1	1145			23.75	1.2	1964	981	4.53	290	Brown/Grey Tannin, No Sulfur odour
BH7	1210			21.79	0.81	391	195	4.6	13.1	Cloudy Brown + Slight sulfur odour
BH6	1230			23.12	0.28	395	168	4.8	6.4	" "
SW5	1300			21.18	0.21	718	359	4.58	-17.6	Cloudy Brown + Sulfur odour
BH2	1330			21.76	0.29	133	67	4.61	230	Dark Brown - Slight Sulfur odour
BH1	1350			21.56	1.12	182	91	5.43	67.9	Cloudy Brown + Sulfur odour
BH11	1400			22.65	0.37	324	162	4.62	34.	" "
BH8	1450			22.58	0.06	545	274	4.51	-28.8	" "

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:

Sample Bottles Collected:

Well ID:	Date:	Field Manager:	Weather Observations:
	17/12	DK.	

QA/QC Samples Collected:

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Tub FNU

	Field Measurements									
	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg/L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria[1]					+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
SW3	1000		594	20	0.98	440	220	5.69	29.3	Small amount of Standing Water
BH4	1145		97.4	20.99	1.65	109	55	6.49	174	No odour - Slight Cloudy Brown
SW1	0900									Dry
SW4	0850		~~78~~							Dry
BH2	1200		783	20.13	1.65	131	66	5.38	178	Dk brown - Slight odour
BH1	1225		150	20.53	2.74	163	81	6.12	15.2	Slight cloudy Brown - No odour
DH11	1300		7000	20.55	1.24	239	120	5.42	-60.7	Cloudy Brown - Sulfur odour
MW29J	1315		7000	20.37	0.33	523	262	5.64	-104.7	Cloudy Brown - Slight Odour
BH6	1345		91.8	21.96	1.86	256	128	5.52	-86.2	Mostly clear - Slight sulfur odour
BH7	1400		88.6	21.87	1.62	292	148	5.93	-92.6	Cloudy Sulfur
BH8	1430		247	22.05	0.39	395	197	6.16	-96.8	Cloudy Brown Sulfur odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:
	WSS		

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
—	16/1/2026	QIC		

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

Tech FNU

Field Measurements

Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
Stabilisation Criteria[1]				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment load, colour, sheen
BH4 1100		169	23.3	1.65	85	42	4.67	221	Slightly Cloudy - No odour
BH2 1130		~~920~~	24.49	2.12	94	47	~~4.84~~	186.5	Cloudy - sulphur odour
BH1 1145		5~~0~~	22.52	1.75	123	62	~~5.39~~	27.7	Slightly Cloudy - No odor
BH11 1215		~~952~~	22.37	1.54	129	65	4.61	42	Cloudy - Sulphur odour
MW23S 1250		~~975~~	24.71	6.70	396	198	4.59	16.1	Dark brown - sulpur odour
BH6 1320		218	24.62	9.08	190		4.39	92.0	Brown - no odour
BH7 1410		253	22.39	2.04	164	82	4.45	23.1	Light ~~brown~~ - ~~no~~ sulphur smell
BH8 1440		891	21.99	4.67	284	142	4.08	45.6	Brown - sulphur odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
[1] These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

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BAILER PURGING AND SAMPLING LOG

Project Number:	Site Name:	Site Address:	Sample Bottles Collected:

Well ID:	Date:	Field Manager:	Weather Observations:	QA/QC Samples Collected:
	27.2.2020			

Well Diameter (mm):	Pre Purging Depth To Water (mBTOC):	Post Purging Depth to Water (mBTOC):

(_____ - _____) x 5 = _____ L
TD (m) - DTW (m) 1 BV

Minimum volume to be purged (3xBV)*: _____ L

	Time	DTW (mBTOC)	Volume Purged (L)	Temp (°C)	DO (mg L)	EC (us/cm)	TDS (mg/L)	pH	Redox (mV)	Description
	Stabilisation Criteria				+/- 10%	+/- 3%	+/- 3%	+/- 0.05	+/- 10 mV	Odour, sediment, colour, sheen
SW3	0920	—	—	20.5	1.05	403.8	—	4.85	320.0	Clear, no odour, no sheen
SW4	1010	—	—	21.3	0.98	427	—	3.68	456	clear slight sulfur odour
SW1	1035	—	—	21.3	6.04	529	—	6.09	6.2	Strained Tannin Natural - Sulfur odour
BH2	1205			21.3	1.46	53.1	—	4.71	266.8	Mod dark brown
BH1	1225	—	—	20.4	2.84	114.3	—	5.22	112.7	Cloudy light Brown - No odour
BH11	1245	—	—	21.0	1.90	62.4	—	4.82	274	Cloudy Brown - Sulfur odour → Rotten
MW23D	1305	—	—	22.1	0.59	235.3	—	4.67	48.3	Cloudy Brown Modurate → Sulfur odour
BH2	1325	—	—	23.4	0.82	113.2	—	4.84	18.5	Light Brown - Slight Sulfur odour
SW7	1345	—	—	22.5	0.90	93.4	—	4.72	-6.8	light - mod brown. No odour
BH8	1410	—	—	21.4	1.33	126	—	4.01	43.8	Mod - Dark brown - Slight Sulfur odour
BH4	1430	—	—	20.7	1.21	117	—	4.27	215	Slightly cloudy Brown - No odour

COMMENTS: _____

* Minimum volume to be purged except where wells are dry.
(1) These parameters may be considered stable when three consecutive readings (obtained several minutes apart) are within these levels.
Source "Victorian Environmental Protection Authority, *Groundwater Sampling Guidelines*, Publication 669, April 2000".

APPENDIX B: MONTHLY REPORTS

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APPENDIX B1: FEBRUARY 2019

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NEWCASTLE OFFICE

11 March 2019
Document Ref: NCA19R_20190320

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Water quality monitoring results at Cabbage Tree Road Sand Quarry – February 2019 monitoring

Please find enclosed the Water quality monitoring results at Cabbage Tree Road Sand Quarry for the February 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The February monitoring round was to include gauging and sampling from 13 monitoring wells (Noting that MW239D was also gauged but not was not proposed to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 21 and 22 February 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The February 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 9 monitoring wells (note MW239D does not require sampling, BH1, BH09, BH10 and BH12 were dry); and
- Surface water sampling from 1 location (all remaining locations were dry on the day of sampling).

Water samples were collected in laboratory supplied containers and place in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of initial Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Extended Water Suite*	10	0	0	0	0
Hydrocarbons**	10	1	1	1	1
Metals***	10	1	1	1	1
Iron (dissolved)	10	1	1	1	1
Total Dissolved Solids (TDS)	10	0	0	0	0
Total Suspended Solids (TSS)	10	0	0	0	0
PFAS (28 analytes, standard level)	10	1	1	1	1

* Extended Water Suite B: Ca, Mg, Na, K, pH, EC, Cl, F, SO_4, Alkalinity, Hardness & TDS (Calc'), Nitrate, Nitrite, Ammonia, Reactive Phosphorus, Total Phosphorus, Total Nitrogen, TKN.
** TRH (C6 – C40), BTEXN (Silica Gel)
*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn)

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Comment
BH1	8.64	5.776	2.864	8.89	No water sample taken due to top of well casing being melted.
BH2*	7.79	5.674	2.116	8.93	Slightly Cloudy, light brown, slight sulfur odour.
BH3	7.57	6.026	1.544	8.94	Light Brown - No Odour.
BH4	3.06	1.994	1.066	5.92	light discolouration – Brown.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Comment
BH5	7.36	6.063	1.297	8.63	Roots evident. Brown slight sulfur odour.
BH6	3.62	1.823	1.797	4.43	Clear to slightly cloudy, sulfur odour.
BH7	2.98	1.938	1.042	4.42	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.78	1.1	6.08	Sulfur smell - Dark Brown.
BH9	17.75	Dry	-	15.82	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.02	3.61	5.21	Brown - No Odour.
BH12	8.67	Dry	-	6.17	Well was dry.
MW239S	3.04	1.529	1.511	3.89	Light Brown - Slight Sulfur odour.
MW239D	3.04	1.312	1.728	20.21	-
SW01*	2.5	Dry	-	N/A	Location was dry.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	1.1	1	N/A	Water was at a low level and was not seen to be flowing.
SW04*	2	Dry	-	N/A	Location was dry.

* Surface water levels measured from measuring tape installed

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH02	1030	22.7	124.1	4.29	111.00
BH03	1440	22.1	82.4	4.54	94.00
BH04	1420	20.4	129.2	3.85	135.00
BH05	830	20.1	320	4.06	122.00
BH06	850	23.1	228	4.28	111.00
BH07	920	23.7	283	4.04	125.00
BH08	1330	21.8	411	4.09	121.00
BH11	1530	22.3	402	3.78	136.00
MW239S	730	21.7	526	4.09	121.00
SW03	1615	26	313	5.11	62.00

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Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in Attachment A

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	0.01	10	4	61	No	N/A
	Sulphate	1	10	4	28	No	N/A
	Chloride	1	10	10	104	No	N/A
	Flouride	0.1	10	<0.1	0.2	No	N/A
	Reactive Phosphorous	0.01	10	<0.01	<0.01	No	N/A
	Total Phosphorous	0.01	10	0.03	2.76	All above ANZECC 2000 Trigger Values[1]	N/A
	Nitrite	0.01	10	<0.01	<0.01	No	N/A
	Nitrate	0.01	10	<0.01	2.76	2 above ANZECC 2000 Trigger Values[1]	N/A
	Ammonia	0.01	10	0.04	0.5	No	N/A
	Total Nitrogen	0.1	10	0.5	5.9	All above ANZECC 2000 Trigger Values[1]	N/A
	Total Hardness	1	10	9.0	41	No	N/A
	Total Dissolved Solids	1	10	96	438	No	N/A
	pH	0.01	10	4.46	6.21	All outside All above ANZECC 2000 Trigger range[1] and drinking water guidelines	N/A
Dissolved Metals	As	0.005-0.1	10	<0.001	0.003	No	N/A
	B	0.005-0.1	10	<0.05	<0.05	No	N/A
	Ba	0.005-0.1	10	0.003	0.075	No	N/A
	Be	0.005-0.1	10	<0.001	<0.001	No	N/A
	Cd	0.005-0.1	10	<0.0001	<0.0001	No	N/A

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	10	<0.001	0.002	4 above ANZECC 2000 Trigger Values[2]	N/A
	Co	0.005-0.1	10	<0.001	0.003	No	N/A
	Cu	0.005-0.1	10	<0.001	0.002	2 above ANZECC 2000 Trigger Values[2]	N/A
	Fe	0.005-0.1	10	0.06	4.84	6 above drinking water aesthetic criteria	N/A
	Mn	0.005-0.1	10	0.003	0.039	No	N/A
	Ni	0.005-0.1	10	0.001	0.053	2 above ANZECC 2000 Trigger Values[2], and 1 above NHMRC ADWG 6	N/A
	Pb	0.005-0.1	10	<0.001	<0.001	No	N/A
	Se	0.005-0.1	10	<0.01	<0.01	No	N/A
	V	0.005-0.1	10	<0.01	<0.01	No	N/A
	Zn	0.005-0.1	10	<0.005	0.031	5 above ANZECC 2000 Trigger Values[2]	N/A
	Hg	0.0001	10	<0.0001	<0.0001	No	N/A
TRH – Silica Clean up	C_6-C_{10}	0.02	10	<0.02	<0.02	No	N/A
	>C_{10}-C_{16}	0.1	10	<0.1	<0.1	No	N/A
	>C_{16}-C_{34}	0.1	10	<0.1	<0.1	No	N/A
	>C_{34}-C_{40}	0.1	10	<0.1	<0.1	No	N/A
	Total >C_{10}-C_{40}	0.1	10	<0.1	<0.1	No	N/A
	C_6-C_{10} minus BTEX (F1)	0.02	10	<0.02	<0.02	No	N/A

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	$>C_{10}$-C_{16} minus Naphthalene (F2)	0.1	10	<0.1	<0.1	No	N/A
BTEX	Benzene	0.001-0.005	10	<0.001	<0.001	No	N/A
	Toluene	0.001-0.005	10	<0.002	<0.002	No	N/A
	Ethylbenzene	0.001-0.005	10	<0.002	<0.002	No	N/A
	Total Xylene	0.001-0.005	10	<0.002	<0.002	No	N/A
	Naphthalene	0.001	10	<0.005	<0.005	No	N/A
PFAS	PFOS	0.00001-0.0001	10	<0.00001	<0.00001	HEPA NEMP 2018*	N/A
	PFOA	0.00001-0.0001	10	<0.00001	<0.00001	No	N/A
	PFOS/PFHxS	0.00001-0.0001	10	<0.00001	<0.00001	No	N/A

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base. The mean monthly rainfall indicates that there has been significantly less rainfall in January and February than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0									
2nd	0	12.8	0									
3rd	0	0.4										
4th	0	0	0									
5th	0	0	0									
6th	0	0	0									
7th	5.0	0										
8th	0	0										
9th	0	6.6										
10th	0.2	0										
11th	0	0										
12th	3.0	0										
13th	0	0										
14th	0	0										
15th	0	0										
16th	0	0										
17th	0	0										
18th	0	0										
19th	0	0										
20th	2.4											
21st	1.0	1.4										
22nd	0	1.0										
23rd	0	1.4										
24th	0	9.2										
25th	0	0										
26th	0	0										
27th	0	0										
28th	1.0	0										
29th	0											
30th	0											
31st	0											
Monthly Total	**14.6**	**33.6**										
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.9**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the rainfall data, it is expected that the current groundwater and surface water levels would be low.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Tom Overton MSc, BSc (Hons), Dip

Senior Project Manager
Contaminated Land Management
toverton@kleinfelder.com

Mobile: 0415 170 312

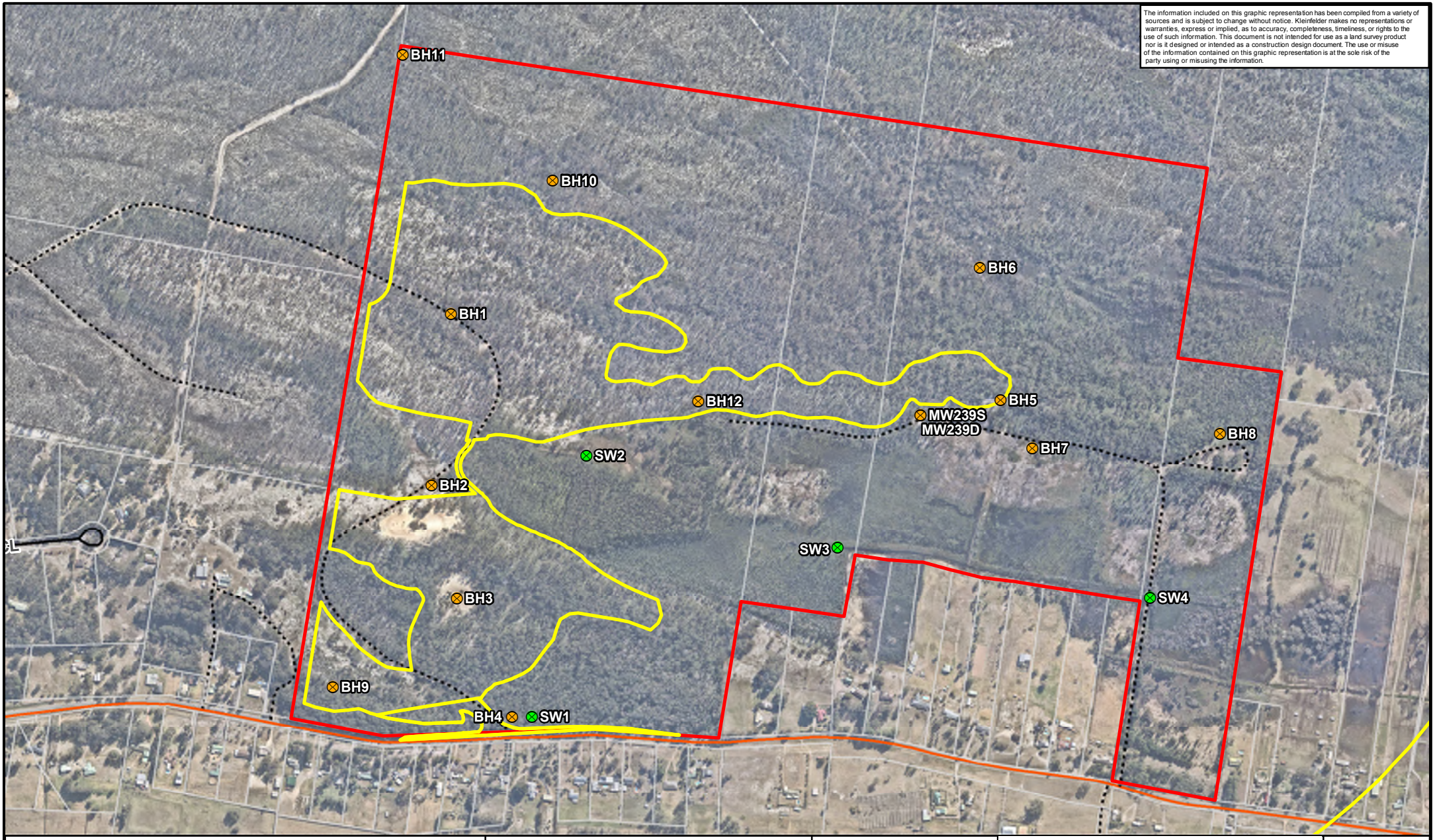
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations February 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table BH01
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH1	387741.2	6369495.8	8.21	8.64	9.45	6.45	8.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	5.776	2.864	8.89	-0.25	-	-	-	-	No water sample taken due to top of well being melted

Table BH02
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH2	387704.7	6369175.1	7.4	7.79	9.45	5.6	8.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	5.674	2.116	8.93	-1.14	22.7	124.1	4.29	111	Slightly Cloudy, light brown, slight sulfur odour

Table BH03
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH3	387751.7	6368964.3	7.03	7.57	9.45	5.45	8.45	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	6.026	1.544	8.94	-1.37	22.1	82.4	4.54	94	Light Brown - No Odour

Table BH04
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH4	387854.9	6368742.8	2.81	3.06	6.45	2.65	5.65	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.994	1.066	5.92	-2.86	20.4	129.2	3.85	135	light discolouration - Brown

Table BH05
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH5	388768.5	6369334.7	6.76	7.36	9.28	8.1	5.1	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	6.063	1.297	8.63	-1.27	20.1	320	4.06	122	Roots evident. Brown slight sulfur odour

Table BH06
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH6	388729.7	6369582.2	3.01	3.62	4.95	3.9	2.4	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.823	1.797	4.43	-0.81	23.1	228	4.28	111	Clear to slightly cloudy, sulfur odour

Table BH07
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH7*	388827.7	6369245.3	2.6	2.98	4.95	2.6	4.1	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.938	1.042	4.42	-1.44	23.7	283	4.04	125	Slightly Cloudy, light brown, slight sulfur odour

Table BH08
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH8	389178.2	6369271.6	3.28	3.88	6.28	3	5.5	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	2.78	1.1	6.08	-2.2	21.8	411	4.09	121	Sulfur smell - Dark Brown

Table BH09
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH9	387520.4	6368798.8	17.07	17.75	18.18	14.6	17.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	15.82	1.93	-	-	-	-	Well was dry

Table BH10
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH10	387931.2	6369744.4	6.09	6.69	5.45	2	5	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	3.58	3.11	-	-	-	-	Well was dry

Table BH11
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH11	387650.6	6369979.7	6.02	6.63	5.95	1.6	4.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	3.02	3.61	5.21	1.42	22.3	402	3.78	136	Brown - No Odour

Table BH12
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH12	388202.9	6369332.9	8.06	8.67	8.39	4.8	7.8	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	6.166	2.504	-	-	-	-	Well was dry

Table BH239S
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
MW239S	388619.1	-	2.98	3.04	4	1	4	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.529	1.511	3.89	-0.85	21.7	526	4.09	121	Light Brown - Slight Sulfur odour

Table BH239D
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
MW239D	388619.1	-	2.98	3.04	21	-	-	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Description
21/02/2019	1.312	1.728	20.21	-17.17	

Table SW01
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW01	387886.7	6368734	2.5

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	2.5	-	-	-	-	No water present

Table SW02
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW02	387988.3	6369234	3.3

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	3.3	-	-	-	-	No water present

Table SW03
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW03	388464.6	6369057	2.1

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.1	1	26	313	5.11	62	Water level low, slight sulfur odour

Table SW04
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW04	389049	6368969	2

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	2	-	-	-	-	No water present

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW2395	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
MW2395	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

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Analyte		Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6											0.56																		0.07		
HEPA NEMP 2018**						0.00023					19																				
HEPA NEMP 2018*											5.6																		0.7		
Sample Name	Sample Date																														
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
* Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

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Analyte		Anions and Cations																		Alkalinity						Inorganics	
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*											125-2200		6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]	6.5-8.5[3]
Sample Name	Sample Date																											
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	4.67
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	4.87
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	5.4
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	4.37
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	4.76
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	4.46
MW2395	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	4.89
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	6.21

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
uS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

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Analyte			Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (NMeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (NEtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reportino
NC - Not calculated
ug/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1905499**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 21-Feb-2019 16:43
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019 17:39
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SINDICATE		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK059G: LOR raised for NOx on sample 2 due to sample matrix.
- EK058G: LOR raised for Nitrate on sample 2 due to sample matrix.
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
			Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit	ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.40	4.46	5.55	4.67	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	1.15	4.44	0.46	3.21	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	73	352	60	346	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	96	258	438	278	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	47	229	39	225	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	122	438	3800	144	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	9	25	14	41	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	6	<1	9	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	6	<1	9	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	11	4	24	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	17	90	10	80	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	2	<1	4	<1	----
Magnesium	7439-95-4	1	mg/L	1	6	1	10	----
Sodium	7440-23-5	1	mg/L	8	52	4	48	----
Potassium	7440-09-7	1	mg/L	1	<1	<1	<1	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L	0.014	0.011	0.003	0.008	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	**0.002**	**0.002**	----
Copper	7440-50-8	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.039**	**0.012**	**0.005**	**0.003**	----
Nickel	7440-02-0	0.001	mg/L		**0.018**	**0.002**	**0.053**	**0.005**	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		**0.014**	**0.005**	<0.005	**0.031**	----
Iron	7439-89-6	0.05	mg/L		**0.16**	**4.10**	**0.06**	**0.26**	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	**0.1**	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.04**	**0.50**	**0.30**	**0.06**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.35**	<0.10	**0.78**	**0.04**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.35**	<0.10	**0.78**	**0.04**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**2.4**	**5.1**	**1.8**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.6**	**2.4**	**5.9**	**1.8**	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.19**	**1.97**	**2.76**	**0.03**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**0.70**	**2.77**	**0.54**	**2.76**	----
Total Cations	----	0.01	meq/L		**0.56**	**2.76**	**0.46**	**2.91**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH4	BH8	BH3	BH11	TRIP BLANK
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	21-Feb-2019 00:00	13-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-001	ES1905499-002	ES1905499-004	ES1905499-005	ES1905499-006
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**87.5**	**86.6**	**106**	**95.4**	**----**
Toluene-D8	2037-26-5	2	%		**98.2**	**86.3**	**103**	**102**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**92.8**	**84.0**	**96.1**	**95.6**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.7**	**93.7**	**99.4**	**96.6**	**95.0**
13C8-PFOA	----	0.02	%		**97.2**	**98.2**	**97.5**	**103**	**98.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	----	4.87	4.87	4.89
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		----	----	1.44	3.59	5.21
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	----	91	250	329
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		----	----	128	211	234
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		----	----	59	162	214
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		----	----	376	458	149
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		----	----	13	25	25
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	----	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	----	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		----	----	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	----	6	19	6
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	----	22	69	104
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		----	----	2	<1	<1
Magnesium	7439-95-4	1	mg/L		----	----	2	6	6
Sodium	7440-23-5	1	mg/L		----	----	12	42	61
Potassium	7440-09-7	1	mg/L		----	----	<1	1	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.014	<0.001	0.005	0.010	0.007
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.001**	<0.001	<0.001	**0.001**	**0.002**
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.012**	<0.001	**0.021**	**0.005**	**0.003**
Nickel	7440-02-0	0.001	mg/L		**0.003**	<0.001	**0.015**	**0.003**	**0.001**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.015**	<0.005	**0.006**	**0.008**	**0.006**
Iron	7439-89-6	0.05	mg/L		**4.09**	<0.05	**0.14**	**1.40**	**1.11**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	----	**0.1**	**0.2**	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	----	**0.05**	**0.09**	**0.18**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	----	**2.76**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	----	**2.76**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	----	**1.2**	**3.0**	**3.9**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	----	**4.0**	**3.0**	**3.9**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	----	**0.28**	**0.34**	**0.56**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	----	<0.01	<0.01	<0.01
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	----	**0.74**	**2.34**	**3.06**
Total Cations	----	0.01	meq/L		----	----	**0.79**	**2.35**	**3.15**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Ionic Balance	----	0.01	%		----	----	----	----	1.43
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RINSATE01	BH2	BH5	MW2395
				Client sampling date / time	21-Feb-2019 00:00	21-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00
Compound	CAS Number	LOR	Unit		ES1905499-007	ES1905499-008	ES1905499-009	ES1905499-010	ES1905499-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**88.4**	**107**	**113**	**108**	**106**
Toluene-D8	2037-26-5	2	%		**102**	**99.4**	**113**	**101**	**99.5**
4-Bromofluorobenzene	460-00-4	2	%		**102**	**96.4**	**109**	**97.9**	**97.1**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.5**	**96.2**	**93.1**	**92.2**	**99.4**
13C8-PFOA	----	0.02	%		**106**	**94.0**	**94.8**	**101**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
				Client sampling date / time	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**4.76**	**4.37**	----	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		**3.16**	**2.49**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**213**	**177**	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**196**	**144**	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		**138**	**115**	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**152**	**41**	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		**20**	**24**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**12**	**28**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**64**	**42**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	**3**	----	----	----
Magnesium	7439-95-4	1	mg/L		**5**	**4**	----	----	----
Sodium	7440-23-5	1	mg/L		**34**	**28**	----	----	----
Potassium	7440-09-7	1	mg/L		**2**	**1**	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		**0.004**	**0.030**	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
				Client sampling date / time	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		**0.003**	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.026**	**0.014**	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.004**	**0.001**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.019**	**0.019**	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**1.80**	**1.03**	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.2**	<0.1	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.34**	**0.14**	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.02**	**0.09**	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.09**	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**2.2**	**0.4**	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**2.2**	**0.5**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.13**	**0.05**	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**2.06**	**1.77**	----	----	----
Total Cations	----	0.01	meq/L		**1.94**	**1.72**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
				Client sampling date / time	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	--------	--------
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
				Client sampling date / time	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	TRIP BLANK	----	----
				Client sampling date / time	22-Feb-2019 00:00	22-Feb-2019 00:00	22-Feb-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1905499-012	ES1905499-013	ES1905499-014	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**105**	**110**	**110**	----	----
Toluene-D8	2037-26-5	2	%		**99.5**	**110**	**108**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**97.7**	**108**	**106**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.5**	**120**	**99.4**	----	----
13C8-PFOA	----	0.02	%		**101**	**119**	**98.7**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1905499**	Page	: 1 of 20
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 21-Feb-2019
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SINDICATE		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 13		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2201054)									
ES1905464-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.56	7.57	0.132	0% - 20%
ES1905583-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.34	7.52	2.42	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2203622)									
ES1905628-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.79	7.78	0.128	0% - 20%
ES1905499-009	BH2	EA005-P: pH Value	----	0.01	pH Unit	4.87	4.86	0.206	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2201055)									
ES1905478-012	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	234	0.851	0% - 20%
ES1905583-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4640	4620	0.236	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2203625)									
ES1905625-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	152	153	0.00	0% - 20%
ES1905499-009	BH2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	91	90	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2204245)									
ES1905489-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	28200	28900	2.35	0% - 20%
ES1905501-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2150	2000	6.98	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2204246)									
ES1905489-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1905501-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	189	180	4.88	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2201051)									
ES1905217-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	31	30	4.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	31	30	4.41	0% - 20%
ES1905464-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2201051) - continued									
ES1905464-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	216	196	9.83	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	216	196	9.83	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2203624)									
ES1905625-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	42	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	42	42	0.00	0% - 20%
ES1905499-009	BH2	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2200015)									
ES1905499-001	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2201525)									
ES1905499-009	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	7	0.00	No Limit
ES1905625-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	4	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2200012)									
ES1905463-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	128	129	0.00	0% - 20%
ES1905423-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	423	425	0.513	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2200016)									
ES1905499-005	BH11	ED045G: Chloride	16887-00-6	1	mg/L	80	80	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2201524)									
ES1905499-009	BH2	ED045G: Chloride	16887-00-6	1	mg/L	22	22	0.00	0% - 20%
ES1905625-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	37	37	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2200621)									
ES1905393-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1905463-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2202352)									
ES1905464-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	49	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	33	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	82	81	1.77	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	32	32	0.00	0% - 20%
ES1904951-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	56	57	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 2202352) - continued									
ES1904951-004	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	48	48	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	72	72	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2200620)									
ES1905393-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.006	0.007	23.4	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1905463-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2202355)									
ES1905499-013	BH6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.030	0.029	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2202355) - continued									
ES1905499-013	BH6	EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.019	0.019	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.03	1.02	0.00	0% - 20%
ES1905464-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.098	0.095	3.15	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.020	0.019	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.138	0.138	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.072	0.069	4.38	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.050	0.049	2.27	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.23	0.22	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.33	0.33	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2200619)									
ES1905463-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1905463-011	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2202354)									
ES1904952-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	0.0001	0.0001	0.00	No Limit
ES1905461-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2202356)									
ES1905499-012	BH7	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2201053)									
ES1905464-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.5	0.5	0.00	No Limit
ES1905583-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2203623)									
ES1905499-009	BH2	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2199613)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2199613) - continued									
ES1905230-003	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.08	70.5	No Limit
ES1905499-005	BH11	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.04	49.6	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2201623)									
ES1905444-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.01	0.00	No Limit
ES1905499-012	BH7	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.34	0.34	0.00	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2200010)									
ES1905499-001	BH4	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905423-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2201527)									
ES1905499-009	BH2	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905625-005	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	0.02	0.02	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2199615)									
ES1905463-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905499-005	BH11	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.04	0.03	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2201624)									
ES1905451-029	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.44	0.44	0.00	0% - 20%
ES1905499-012	BH7	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2199618)									
ES1905463-009	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	4.2	3.8	9.88	0% - 20%
ES1905499-005	BH11	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.8	1.6	10.1	0% - 50%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2201621)									
ES1905451-029	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
ES1905625-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2199619)									
ES1905517-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	31.0	31.3	1.11	0% - 20%
ES1905499-005	BH11	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.03	0.08	87.2	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2201620)									
ES1905451-029	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.00	No Limit
ES1905625-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2200011)									
ES1905463-006	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905423-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2200017)									
ES1905499-005	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2201526)									
ES1905499-009	BH2	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905625-005	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	0.12	0.12	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2199795)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2199795) - continued									
ES1905215-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905560-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905499-013	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2199795)									
ES1905215-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905560-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905499-013	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2199795)									
ES1905215-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1905560-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 2202280)									
ES1905444-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1905499-013	BH6	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2202280) - continued									
ES1905499-013	BH6	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.21	1.21	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.22	0.22	0.00	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280) - continued									
EB1904270-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	TRIP BLANK	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280) - continued									
ES1905499-006	TRIP BLANK	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.63	1.63	0.00	0% - 20%
ES1905499-006	TRIP BLANK	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2201054)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2203622)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.5	98	102
				----	7 pH Unit	99.6	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2201055)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	104	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2203625)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.6	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2204245)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	87	109
				<10	293 mg/L	118	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2204246)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.0	83	129
				<5	1000 mg/L	104	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2201051)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	81	111
				----	50 mg/L	116	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2203624)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	81	111
				----	50 mg/L	119	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2200015)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201525)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2200012)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	81	127
				<1	1000 mg/L	96.2	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2200016)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	96.2	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2201524)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 2201524) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	116	81	127
				<1	1000 mg/L	108	81	127
ED093F: Dissolved Major Cations (QCLot: 2200621)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.5	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.8	85	113
ED093F: Dissolved Major Cations (QCLot: 2202352)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.8	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.0	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.4	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.9	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.6	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.4	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.0	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.6	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.2	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.2	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.1	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.0	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.5	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.1	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	89.3	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.8	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2200619)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.4	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2202354)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.6	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2202356)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.9	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2201053)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	94.2	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2203623)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.8	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2199613)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.9	90	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2201623)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	99.2	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2200010)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	82	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201527)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	100	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2199615)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.8	91	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2201624)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	97.0	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2199618)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	70.4	69	101
				<0.1	1 mg/L	76.7	70	118
				<0.1	5 mg/L	78.6	74	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2201621)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.5	69	101
				<0.1	1 mg/L	90.4	70	118
				<0.1	5 mg/L	102	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619) - continued								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	74.4	71	101
				<0.01	0.442 mg/L	78.1	72	108
				<0.01	1 mg/L	80.3	78	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2201620)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	95.6	71	101
				<0.01	0.442 mg/L	93.8	72	108
				<0.01	1 mg/L	97.0	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200011)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	99.5	85	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200017)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	98.2	85	117
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201526)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	88.5	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2199869)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	87.4	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	95.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	90.5	71	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2201957)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	82.0	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2199869)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	83.3	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	87.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.8	65	127
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2201957)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.0	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	108	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2199795)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	82.3	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2202280)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.7	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2199795)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	86.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2202280)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	89.9	75	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2199795)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	88.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	80.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.7	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	92.8	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.9	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.7	70	120
EP080: BTEXN (QCLot: 2202280)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	92.2	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	90.2	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	88.8	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.2	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.6	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	95.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.3	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	98.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	99.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.6	70	150

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	98.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.9	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	96.0	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	119	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2200015)							
ES1905499-001	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	104	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201525)							
ES1905499-009	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	113	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2200012)							
ES1905423-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	79.8	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2200016)							
ES1905499-005	BH11	ED045G: Chloride	16887-00-6	250 mg/L	104	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2201524)							
ES1905499-009	BH2	ED045G: Chloride	16887-00-6	250 mg/L	107	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620)							
ES1905463-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	101	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.2	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	101	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	101	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.1	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2200620) - continued							
ES1905463-002	Anonymous	EG020A-F: Cobalt	7440-48-4	1 mg/L	97.7	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	99.3	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	97.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.4	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.6	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	99.0	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2202355)							
ES1905464-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	97.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	93.8	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	96.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.3	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	97.8	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	98.9	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	95.1	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	93.9	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.3	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	94.3	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	97.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2200619)							
ES1905269-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	110	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2202354)							
ES1904952-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	107	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2202356)							
ES1905499-011	MW2395	EG035F: Mercury	7439-97-6	0.01 mg/L	126	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2201053)							
ES1905423-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	114	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2203623)							
ES1905499-009	BH2	EK040P: Fluoride	16984-48-8	5 mg/L	101	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2199613)							
ES1905230-003	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	92.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2201623)							
ES1905444-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	122	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2200010)							
ES1905423-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	102	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201527)							
ES1905499-009	BH2	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	100	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2199615)							
ES1905463-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2201624)							
ES1905451-029	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	112	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2199618)							
ES1905463-011	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	99.1	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2201621)							
ES1905451-030	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	100	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2199619)							
ES1905463-011	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	72.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2201620)							
ES1905451-030	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	96.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200011)							
ES1905423-001	Anonymous	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2200017)							
ES1905499-005	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	100	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201526)							
ES1905499-009	BH2	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	88.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	102	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	84.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	98.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	88.0	70	130
EP080: BTEXN (QCLot: 2199795)							
ES1905215-006	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.7	70	130
		EP080: Toluene	108-88-3	25 µg/L	105	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	109	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	109	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2199795) - continued							
ES1905215-006	Anonymous	EP080: Naphthalene	91-20-3	25 µg/L	101	70	130
EP080: BTEXN (QCLot: 2202280)							
ES1905444-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	89.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.0	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	86.4	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	89.8	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.3	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	70.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	71.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	75.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	74.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	69.3	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	82.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	80.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	93.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	90.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	94.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	84.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	76.2	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	61.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	93.5	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	86.3	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	75.1	50	150

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued							
EB1904270-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	95.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	75.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	101	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	99.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	97.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	101	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1905499**	Page	: 1 of 14
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 21-Feb-2019
Site	: WILLIAM TOWN SANDS SINDICATE	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
BH4, BH8, BH3, BH11	----	----	----	22-Feb-2019	21-Feb-2019	**1**
Clear Plastic Bottle - Natural						
BH2, BH5, MW2395, BH7, BH6	----	----	----	25-Feb-2019	22-Feb-2019	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Feb-2019	×
Clear Plastic Bottle - Natural (EA005-P)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Feb-2019	×

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA006: Sodium Adsorption Ratio (SAR)							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EA010-P)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**26-Feb-2019**	28-Feb-2019	✓
Clear Plastic Bottle - Natural (EA015H)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**26-Feb-2019**	01-Mar-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**26-Feb-2019**	28-Feb-2019	✓
Clear Plastic Bottle - Natural (EA025H)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**26-Feb-2019**	01-Mar-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	07-Mar-2019	✓
Clear Plastic Bottle - Natural (ED037-P)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	08-Mar-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (ED041G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	22-Mar-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (ED045G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	22-Mar-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	20-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
DUP01, RINSATE01	**21-Feb-2019**	**----**	----	----	**25-Feb-2019**	20-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	21-Aug-2019	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-F)							
TRIP BLANK	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	21-Aug-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**----**	----	----	**26-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**26-Feb-2019**	22-Mar-2019	✓
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035F)							
TRIP BLANK	**22-Feb-2019**	**----**	----	----	**26-Feb-2019**	08-Mar-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EK040P)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK055G)							
BH8	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	22-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH4, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**23-Feb-2019**	22-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	23-Feb-2019	✓
Clear Plastic Bottle - Natural (EK057G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	24-Feb-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Natural (EK059G)							
BH8	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	23-Feb-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH4, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**23-Feb-2019**	22-Mar-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Natural (EK061G)							
BH8	**21-Feb-2019**	**22-Feb-2019**	22-Feb-2019	✓	**22-Feb-2019**	22-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH4, BH3, BH11	**21-Feb-2019**	**22-Feb-2019**	21-Mar-2019	✓	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**23-Feb-2019**	22-Mar-2019	✓	**23-Feb-2019**	22-Mar-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Natural (EK067G)							
BH8	**21-Feb-2019**	**22-Feb-2019**	23-Feb-2019	✓	**22-Feb-2019**	22-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH4, BH3, BH11	**21-Feb-2019**	**22-Feb-2019**	21-Mar-2019	✓	**22-Feb-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**23-Feb-2019**	22-Mar-2019	✓	**23-Feb-2019**	22-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH4, BH8, BH3, BH11	**21-Feb-2019**	**----**	----	----	**22-Feb-2019**	23-Feb-2019	✓
Clear Plastic Bottle - Natural (EK071G)							
BH2, BH5, MW2395, BH7, BH6	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	24-Feb-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**22-Feb-2019**	28-Feb-2019	✓	**25-Feb-2019**	03-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG)							
BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	01-Mar-2019	✓	**28-Feb-2019**	07-Apr-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**22-Feb-2019**	28-Feb-2019	✓	**25-Feb-2019**	03-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG)							
BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	01-Mar-2019	✓	**28-Feb-2019**	07-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**25-Feb-2019**	07-Mar-2019	✓	**25-Feb-2019**	07-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**25-Feb-2019**	07-Mar-2019	✓	**25-Feb-2019**	07-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**25-Feb-2019**	07-Mar-2019	✓	**25-Feb-2019**	07-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) TRIP BLANK	**13-Feb-2019**	**26-Feb-2019**	12-Aug-2019	✓	**26-Feb-2019**	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**26-Feb-2019**	20-Aug-2019	✓	**26-Feb-2019**	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) TRIP BLANK	**13-Feb-2019**	**26-Feb-2019**	12-Aug-2019	✓	**26-Feb-2019**	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**26-Feb-2019**	20-Aug-2019	✓	**26-Feb-2019**	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) TRIP BLANK	**13-Feb-2019**	**26-Feb-2019**	12-Aug-2019	✓	**26-Feb-2019**	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**26-Feb-2019**	20-Aug-2019	✓	**26-Feb-2019**	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) TRIP BLANK	**13-Feb-2019**	**26-Feb-2019**	12-Aug-2019	✓	**26-Feb-2019**	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**26-Feb-2019**	20-Aug-2019	✓	**26-Feb-2019**	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) TRIP BLANK	**13-Feb-2019**	**26-Feb-2019**	12-Aug-2019	✓	**26-Feb-2019**	12-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH4, BH8, BH3, BH11, DUP01, RINSATE01	**21-Feb-2019**	**26-Feb-2019**	20-Aug-2019	✓	**26-Feb-2019**	20-Aug-2019	✓
HDPE (no PTFE) (EP231X) BH2, BH5, MW2395, BH7, BH6, TRIP BLANK	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	28	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	5	48	**10.42**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	5	41	**12.20**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	3	20	**15.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	5	41	**12.20**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	6	48	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	32	**18.75**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	32	**18.75**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	48	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	15	**13.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	48	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	3	41	**7.32**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1905499**

Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dkousbroek@kleinfelder.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 20190803	Page	: 1 of 3
Order number	:	Quote number	: EM2019ALLENVENG0010 (ME/114/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: WILLIAM TOWN SANDS SINDICATE		
Sampler	: DANIEL KOUSBROEK		

Dates

Date Samples Received	: 21-Feb-2019 16:43	Issue Date	: 22-Feb-2019
Client Requested Due Date	: 28-Feb-2019	Scheduled Reporting Date	: **28-Feb-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 6.8'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- 22/02/19: This is an updated SRN which indicates the new scheduled release date for this work order.
- **Sample TRIP01 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Dissolved Mercury by FIMS : EG035F		
TRIP BLANK	- Clear Plastic Bottle - Nitric Acid; Unspecified	- Clear Plastic Bottle - Nitric Acid; Filtered
Dissolved Metals by ICP-MS - Suite A : EG020A-F		
TRIP BLANK	- Clear Plastic Bottle - Nitric Acid; Unspecified	- Clear Plastic Bottle - Nitric Acid; Filtered

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1905499-001	21-Feb-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1905499-002	21-Feb-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1905499-004	21-Feb-2019 00:00	BH3	✓	✓	✓	✓	✓	✓	✓
ES1905499-005	21-Feb-2019 00:00	BH11	✓	✓	✓	✓	✓	✓	✓
ES1905499-006	13-Feb-2019 00:00	TRIP BLANK				✓			
ES1905499-007	21-Feb-2019 00:00	DUP01			✓	✓		✓	✓
ES1905499-008	21-Feb-2019 00:00	RINSATE01			✓	✓		✓	✓
ES1905499-009	22-Feb-2019 00:00	BH2	✓	✓	✓	✓	✓	✓	✓
ES1905499-010	22-Feb-2019 00:00	BH5	✓	✓	✓	✓	✓	✓	✓
ES1905499-011	22-Feb-2019 00:00	MW2395	✓	✓	✓	✓	✓	✓	✓
ES1905499-012	22-Feb-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1905499-013	22-Feb-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1905499-014	22-Feb-2019 00:00	TRIP BLANK			✓	✓		✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) WATER No analysis requested
ES1905499-003	21-Feb-2019 00:00	BH2	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

Refer to Work order Ref: ES1905499

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd	Site Name:	William Town Sands Sindicate	Sampler Name:	Dan Kousbroek	ALS
95 Mitchell Road	QUOTE NUMBER	ME/114/19	Contact Number:	0458197 676	5/585 Maitland Rd
Cardiff,	Job No.:	20190803	Contact e-mail:	dkousbroek@kleinfelder.com	Mayfield West,
NSW 2285	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	Newcastle NSW 2304
Phone: 02 4949 5200	Data QA level:	LAB minimum unless specified	PM e-mail:	toverton@kleinfelder.com	Phone: (02) 4014 2500

CHAIN OF CUSTODY								Send Results to:
Relinquished by (print): D. Kousbroek (Kleinfelder Cardiff)		Received by (print): W. McAHAN		Relinquished:		Received by:	AT	
(sign)		(sign)		(sign)		(sign)		
Date / Time:	22.2.19	Date / Time:	22/2/19 12:11	Date / Time:	22/2/19 5pm	Date / Time:	22/2/19	95 Mitchell Road
Notes:		Temp. (°C)	1.9	Notes:		Temp. (°C)	19.3	Cardiff, NSW 2285
		Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal	newcastle@kleinfelder.com
								Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG	Metals: Additional Metals to make up NEPM 15	Metals: Iron (dissolved)	Other Analytes: NT14	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
BH2	9		Water	22.2.19				7	X	X	X	X	Y	X	X	
BH5	10		Water	22.2.19				7	X	X	X	X	X	X	X	
MW2395	11		Water	22.2.19				7	X	X	X	X	X	X	X	
BH7	12		Water	22.2.19				7	X	X	X	X	X	X	X	
BH6	13		Water	22.2.19				7	X	X	X	X	X	X	X	
TRIP BLANK	14		Water	22.2.19				5	X	X	X				X	

RECEIVED

LAB OF ORIGIN: NEWCASTLE

Environmental Division Sydney
Work Order Reference
ES1905499

Telephone : + 61-2-8784 8555

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1905667**	Page	: 1 of 8
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190903	Date Samples Received	: 22-Feb-2019 17:16
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019 15:30
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SANDICATE		
Quote number	: ME/114/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK057G: LOR raised for Nitrite on sample 1 due to sample matrix.
- EK071G: LOR raised for Reactive Phosphorus on sample 1 due to sample matrix.
- EK059G-EK058G: LOR raised for NOx-Nitrate on sample 1 due to sample matrix.
- EA015: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW3	----	----	----	----
			Client sampling date / time	22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1905667-001	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**6.21**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**3.38**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**262**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**228**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**170**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**58**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**26**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**11**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**11**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**16**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**82**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**4**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**4**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**40**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.003**	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.075**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
				Client sampling date / time	22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.033**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.016**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**4.84**	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.16**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.05	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.05	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.05	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.0**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.0**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.06**	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.05	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**2.87**	----	----	----	----
Total Cations	----	0.01	meq/L		**2.55**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
				Client sampling date / time	22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	--------	--------	--------	--------
					Result	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
				Client sampling date / time	22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
				Client sampling date / time	22-Feb-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1905667-001	--------	--------	--------	--------
					Result	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**106**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**100**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**98.6**	----	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	----	----	----	----
13C8-PFOA	----	0.02	%		**98.3**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1905667**	Page	: 1 of 13
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190903	Date Samples Received	: 22-Feb-2019
Order number	:	Date Analysis Commenced	: 22-Feb-2019
C-O-C number	: ----	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WILLIAM TOWN SANDS SANDICATE		
Quote number	: ME/114/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2201508)									
ES1905631-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.10	7.10	0.00	0% - 20%
EW1900748-005	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.33	6.31	0.316	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2201505)									
ES1905451-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	<1	0.00	No Limit
EW1900748-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	96	96	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2205368)									
ES1905581-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3160	3210	1.60	0% - 20%
ES1905749-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	276	270	2.38	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2205367)									
ES1905581-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	502	518	3.14	0% - 20%
ES1905749-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2201509)									
ES1905631-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1540	1630	5.24	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1540	1630	5.24	0% - 20%
EW1900748-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	4	4	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	4	4	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2201771)									
ES1905601-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1220	1210	0.734	0% - 20%
ES1905667-001	SW3	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	16	17	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2201770)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 2201770) - continued									
ES1905601-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	101	101	0.00	0% - 20%
ES1905636-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	36	36	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2203447)									
EW1900729-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	27	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EW1900729-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	27	26	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2203445)									
EW1900729-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.037	0.036	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.096	0.096	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.05	0.06	0.00	No Limit
EW1900729-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.097	0.097	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2203445) - continued									
EW1900729-002	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2203446)									
ES1905625-012	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2201507)									
ES1905631-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2202253)									
ES1905472-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	2.52	2.50	0.863	0% - 20%
EW1900735-002	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	716	710	0.842	0% - 20%
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2201775)									
ES1905667-001	SW3	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.05	<0.05	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2202252)									
ES1905560-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1905472-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.06	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2202256)									
ES1905472-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	25.7	27.0	4.84	0% - 20%
ES1905559-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	60.2	54.2	10.5	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2202255)									
ES1905472-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	3.82	3.90	2.10	0% - 20%
ES1905559-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	6.98	6.59	5.71	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2201774)									
ES1905667-001	SW3	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.05	<0.05	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1905540-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	510	520	1.97	0% - 20%
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1905540-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	510	520	1.95	0% - 20%
EP080: BTEXN (QC Lot: 2203150)									
ES1905399-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1905540-002	Anonymous	EP080: Benzene	71-43-2	1	µg/L	2	2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2203150) - continued									
ES1905540-002	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.21	1.21	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.10	0.10	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.22	0.22	0.00	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2204280) - continued									
ES1905499-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1905499-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2204280) - continued									
ES1905499-006	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2204280)									
EB1904270-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.63	1.63	0.00	0% - 20%
ES1905499-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2201508)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	102	98	102
				----	7 pH Unit	99.6	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2201505)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	96.9	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2205368)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	103	87	109
				<10	293 mg/L	123	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2205367)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.0	83	129
				<5	1000 mg/L	91.0	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2201509)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	81	111
				----	50 mg/L	111	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201771)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2201770)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	89.5	81	127
ED093F: Dissolved Major Cations (QCLot: 2203447)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.9	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.3	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.0	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.4	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	87.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.1	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.4	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.1	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.7	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.1	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	85.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.5	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2203446)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.9	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2201507)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.6	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2202253)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	101	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201775)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	103	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2202252)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202256)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	98.4	69	101
				<0.1	1 mg/L	85.5	70	118
				<0.1	5 mg/L	79.6	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2202255)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	93.2	71	101
				<0.01	0.442 mg/L	87.0	72	108
				<0.01	1 mg/L	79.4	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201774)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	95.1	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2201957)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.6	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	82.0	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2201957)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.0	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	108	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2203150)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	87.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	89.7	75	127
EP080: BTEXN (QCLot: 2203150)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	89.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.3	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.0	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	93.0	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.9	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.0	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	90.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	97.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	95.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	97.3	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	98.6	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.4	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	99.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	98.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	96.6	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	98.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	98.9	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	LCS: Spike Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	96.0	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	119	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2201771)							
ES1905601-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2201770)							
ES1905601-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	98.7	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2203445)							
ES1905625-011	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	94.7	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	90.8	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	94.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.0	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.0	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	94.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	93.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	88.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.9	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	95.0	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2203446)							
ES1905625-011	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2201507)							
ES1905631-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	103	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2202253)							
ES1905472-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	87.9	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2201775)							
ES1905667-001	SW3	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2202252)							
ES1905472-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	109	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2202256)							
ES1905473-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	25 mg/L	82.2	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2202255)							
ES1905473-001	Anonymous	EK067G: Total Phosphorus as P	----	5 mg/L	90.8	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2201774)							
ES1905667-001	SW3	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	91.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	98.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	98.9	70	130
EP080: BTEXN (QCLot: 2203150)							
ES1905399-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	90.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	93.3	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	90.8	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	93.0	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	70.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	71.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	75.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	74.6	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	69.3	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	80.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	92.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	82.8	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	80.8	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2204280) - continued							
EB1904270-002	Anonymous	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	93.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	90.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	94.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	84.6	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	76.2	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	61.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	93.5	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	86.3	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	75.1	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	95.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	75.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2204280)							
EB1904270-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	101	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	99.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	97.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	101	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1905667**	Page	: 1 of 9
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20190903	Date Samples Received	: 22-Feb-2019
Site	: WILLIAM TOWN SANDS SANDICATE	Issue Date	: 28-Feb-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1905601--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)	***Sample Date***	*Extraction / Preparation* ***Date extracted***	*Due for extraction*	*Evaluation*	*Analysis* ***Date analysed***	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
SW3	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	22-Feb-2019	✓
EA006: Sodium Adsorption Ratio (SAR)							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW3	**22-Feb-2019**	**----**	----	----	**25-Feb-2019**	22-Mar-2019	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
SW3	**22-Feb-2019**	**----**	----	----	**22-Feb-2019**	22-Mar-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
SW3	**22-Feb-2019**	**----**	----	----	**27-Feb-2019**	01-Mar-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
SW3	**22-Feb-2019**	**----**	----	----	**27-Feb-2019**	01-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW3	22-Feb-2019	----	----	----	22-Feb-2019	08-Mar-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
SW3	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
SW3	22-Feb-2019	----	----	----	23-Feb-2019	22-Mar-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
SW3	22-Feb-2019	----	----	----	25-Feb-2019	21-Aug-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
SW3	22-Feb-2019	----	----	----	26-Feb-2019	22-Mar-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
SW3	22-Feb-2019	----	----	----	22-Feb-2019	22-Mar-2019	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
SW3	22-Feb-2019	----	----	----	23-Feb-2019	24-Feb-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
SW3	22-Feb-2019	----	----	----	25-Feb-2019	22-Mar-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
SW3	22-Feb-2019	25-Feb-2019	22-Mar-2019	✓	25-Feb-2019	22-Mar-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
SW3	22-Feb-2019	25-Feb-2019	22-Mar-2019	✓	25-Feb-2019	22-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
SW3	**22-Feb-2019**	**----**	----	----	**23-Feb-2019**	24-Feb-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
SW3	**22-Feb-2019**	**26-Feb-2019**	01-Mar-2019	✓	**28-Feb-2019**	07-Apr-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
SW3	**22-Feb-2019**	**26-Feb-2019**	01-Mar-2019	✓	**28-Feb-2019**	07-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW3	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW3	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW3	**22-Feb-2019**	**25-Feb-2019**	08-Mar-2019	✓	**25-Feb-2019**	08-Mar-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW3	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SW3	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
SW3	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW3	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SW3	**22-Feb-2019**	**26-Feb-2019**	21-Aug-2019	✓	**26-Feb-2019**	21-Aug-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	7	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	14	**21.43**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	7	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1905667**

Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dkousbroek@kleinfelder.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 20190903	Page	: 1 of 2
Order number	:	Quote number	: EM2019ALLENVENG0010 (ME/114/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: WILLIAM TOWN SANDS SANDICATE		
Sampler	: DANIEL KOUSBROEK		

Dates

Date Samples Received	: 22-Feb-2019 17:16	Issue Date	: 22-Feb-2019
Client Requested Due Date	: 28-Feb-2019	Scheduled Reporting Date	: **28-Feb-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 4.3'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1905667-001	22-Feb-2019 00:00	SW3	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	William Town Sands Sindicate	Sampler Name:	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER:	ME/114/19	Contact Number:	045 8197 676	
	Job No.:	20190603	Contact e-mail:	dkousbroek@kleinfelder.com	
	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	
	Data QA level:	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com	

CHAIN OF CUSTODY

								Send Results to:
Relinquished by (print):	D. Kousbroek Cleaning Co!	Received by (print):	K Jones	Relinquished:	K Jones	Received by:	A's	
(sign)		(sign)	KJones	(sign)	KJones	(sign)	AHmJ.	95 Mitchell Road Cardiff, NSW 2285
Date / Time:	22-2-19 1715	Date / Time:	22/2/19 17:15pm	Date / Time:	22/2/19 5:30pm	Date / Time:	22/2/19 19:35	
Notes:		Temp. (°C)	4.3°C	Notes:		Temp. (°C)		newcastle@kleinfelder.com Phone: 02 4949 5200
		Notes:	Ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal	

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG	Metals: Additional Metals to make up NEPM 13	Metals: Iron (dissolved)	Other Analytes: NT 14	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
1 SW3			Wat.	22.2.19				7	X	X	X	X	X	X	X	

E-MAILED

LAB OF ORIGIN:
NEWCASTLE

Environmental Division
Sydney
Work Order Reference
ES1905667

Telephone : +61-2-8784 8555

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name	William Town Sands Sindicate	Sampler Name	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number	045 8197 676	
	Job No.	20190903	Contact e-mail	dkousbroek@kleinfelder.com	
	Required TAT	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler)	Tom Overton	
	Data QA level	LAB minimum unless specified	PM e-mail	toverton@kleinfelder.com	

CHAIN OF CUSTODY								
Relinquished by (print) / (sign)	D. Kousbroek	Received by (print) / (sign)		Relinquished (sign)		Received by: (sign)		Send Results to:
Date / Time	21/2/19	Date / Time	21/2/19 16:43	Date / Time		Date / Time		95 Mitchell Road Cardiff, NSW 2285
Notes:		Temp (°C)	6.8	Notes:		Temp (°C)		newcastle@kleinfelder.com Phone: 02 4949 5200
		Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal	

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-66 SG	Metals: Additional Metals to make up NEPM 15	Metals: Iron (dissolved)	Other Analytes: NT 14	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
BH4			Water	21/2/19				7	X	X	X	X	X	X	X	
BH8			Water	21/2/19				7	X	X	X	X	X	X	X	
BH2			Water	21/2/19				6	X	X	X		X	X	X	Hold.
BH3			Water	21/2/19				7	X	X	X	X	X	X	X	
BH11			Water	21/2/19				7	X	X	X	X	X	X	X	
TRIPBlank			Water	21/2/19				2	X	X	X				X	
DUP01			Water	21/2/19				5	X	X	X				X	
TRIP01			Water	21/4/19				5	X	X	X				X	Send to Eurofins
Rinsate01			Water	21/2/19				5	X	X	X				X	

Suspect / Forward Lab / Split WO
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Consignment / Courier:
WO No.:
Attach By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1905499

Telephone : - 61-2-8784 8555

W-66 SG - TRHBTEXN & Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Put on hold. COC's also tick for analysis. Please clarify. Thanks P.T 21/2/19

642019 8.83°C

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name:	Dan Kousbroek
Project name:	WILLIAM TOWN SANDS SINDICATE
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Feb 22, 2019 4:01 PM
Eurofins | mgt reference:	**642019**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Dan Kousbroek - dkousbroek@kleinfelder.com.

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285

Project Name: WILLIAM TOWN SANDS SINDICATE

Order No.:
Report #: 642019
Phone: 02 4949 5200
Fax:

Received: Feb 22, 2019 4:01 PM
Due: Mar 1, 2019
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	TRIP01	Feb 21, 2019		Water	S19-Fe30830	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Dan Kousbroek**

Report **642019-W**
Project name WILLIAM TOWN SANDS SINDICATE
Received Date Feb 22, 2019

Client Sample ID			**TRIP01**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Fe30830**
Date Sampled			**Feb 21, 2019**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	87
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1

Client Sample ID			TRIP01
Sample Matrix			Water
Eurofins | mgt Sample No.			S19-Fe30830
Date Sampled			Feb 21, 2019
Test/Reference	LOR	Unit	
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	155
13C2-8:2 FTSA (surr.)	1	%	145
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
13C2-6:2 FTSA (surr.)	1	%	INT
PFASs Summations			
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	0.001
Barium (filtered)	0.02	mg/L	< 0.02
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	4.5
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.012
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.006
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	140
13C5-PFPeA (surr.)	1	%	125

Client Sample ID			TRIP01
Sample Matrix			Water
Eurofins | mgt Sample No.			S19-Fe30830
Date Sampled			Feb 21, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
13C5-PFHxA (surr.)	1	%	110
13C4-PFHpA (surr.)	1	%	124
13C8-PFOA (surr.)	1	%	122
13C5-PFNA (surr.)	1	%	90
13C6-PFDA (surr.)	1	%	132
13C2-PFUnDA (surr.)	1	%	102
13C2-PFDoDA (surr.)	1	%	97
13C2-PFTeDA (surr.)	1	%	93
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	92
D3-N-MeFOSA (surr.)	1	%	55
D5-N-EtFOSA (surr.)	1	%	54
D7-N-MeFOSE (surr.)	1	%	76
D9-N-EtFOSE (surr.)	1	%	93
D5-N-EtFOSAA (surr.)	1	%	36
D3-N-MeFOSAA (surr.)	1	%	33
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	128
18O2-PFHxS (surr.)	1	%	140
13C8-PFOS (surr.)	1	%	122

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Feb 22, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Feb 22, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Feb 22, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Feb 22, 2019	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Sydney	Feb 22, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Sydney	Feb 22, 2019	7 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Per- and Polyfluoroalkyl Substances (PFASs)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Feb 25, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Feb 25, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Feb 25, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Feb 25, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent)	Sydney	Feb 22, 2019	28 Day
- Method: E057 Total Speciated Chromium			
Chromium (trivalent filtered)	Sydney	Mar 01, 2019	28 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Mar 01, 2019	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Mar 01, 2019	28 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**		**Received:**	Feb 22, 2019 4:01 PM
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	642019	**Due:**	Mar 1, 2019
		Phone:	02 4949 5200	**Priority:**	5 Day
		Fax:		**Contact Name:**	Dan Kousbroek
Project Name:	WILLIAM TOWN SANDS SINDICATE				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271											
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794											X
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	TRIP01	Feb 21, 2019		Water	S19-Fe30830	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	86			70-130	Pass	
TRH C10-C14	%	105			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	92			70-130	Pass	
Ethylbenzene	%	92			70-130	Pass	
m&p-Xylenes	%	94			70-130	Pass	
o-Xylene	%	94			70-130	Pass	
Xylenes - Total	%	94			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	108			70-130	Pass	
TRH C6-C10	%	87			70-130	Pass	
TRH >C10-C16	%	128			70-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	100			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	99			70-130	Pass	
Barium (filtered)	%	104			70-130	Pass	
Beryllium (filtered)	%	82			70-130	Pass	
Boron (filtered)	%	78			70-130	Pass	
Cadmium (filtered)	%	95			70-130	Pass	
Chromium (filtered)	%	104			70-130	Pass	
Cobalt (filtered)	%	103			70-130	Pass	
Copper (filtered)	%	104			70-130	Pass	
Iron (filtered)	%	98			70-130	Pass	
Lead (filtered)	%	99			70-130	Pass	
Manganese (filtered)	%	97			70-130	Pass	
Mercury (filtered)	%	106			70-130	Pass	
Nickel (filtered)	%	105			70-130	Pass	
Vanadium (filtered)	%	100			70-130	Pass	
Zinc (filtered)	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Fe26112	NCP	%	124			70-130	Pass	
Toluene	S19-Fe26112	NCP	%	120			70-130	Pass	
Ethylbenzene	S19-Fe26112	NCP	%	113			70-130	Pass	
m&p-Xylenes	S19-Fe26112	NCP	%	123			70-130	Pass	
o-Xylene	S19-Fe26112	NCP	%	128			70-130	Pass	
Xylenes - Total	S19-Fe26112	NCP	%	125			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Fe26112	NCP	%	113			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	S19-Fe38772	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M19-Fe27538	NCP	%	117			70-130	Pass	
Barium (filtered)	M19-Fe27538	NCP	%	101			70-130	Pass	
Beryllium (filtered)	M19-Fe27538	NCP	%	99			70-130	Pass	
Cadmium (filtered)	M19-Fe27538	NCP	%	103			70-130	Pass	
Chromium (filtered)	M19-Fe27538	NCP	%	103			70-130	Pass	
Cobalt (filtered)	M19-Fe27538	NCP	%	90			70-130	Pass	
Copper (filtered)	M19-Fe27538	NCP	%	97			70-130	Pass	
Lead (filtered)	M19-Fe27538	NCP	%	91			70-130	Pass	
Nickel (filtered)	M19-Fe27538	NCP	%	97			70-130	Pass	
Vanadium (filtered)	M19-Fe27538	NCP	%	105			70-130	Pass	
Zinc (filtered)	M19-Fe27538	NCP	%	82			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Fe26111	NCP	mg/L	0.45	0.45	1.0	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Fe26111	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Fe26111	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Fe26111	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Fe26111	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Fe26111	NCP	mg/L	0.44	0.44	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	S19-Fe30830	CP	mg/L	< 0.005	0.006	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	M19-Fe27537	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	M19-Fe27537	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	M19-Fe27537	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M19-Fe27537	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M19-Fe27537	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M19-Fe27537	NCP	mg/L	0.18	0.19	1.0	30%	Pass	
Mercury (filtered)	M19-Fe27537	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	M19-Fe27537	NCP	mg/L	0.001	0.001	6.0	30%	Pass	
Vanadium (filtered)	M19-Fe27537	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M19-Fe27537	NCP	mg/L	0.008	0.008	3.0	30%	Pass	

Comments

Sample Integrity

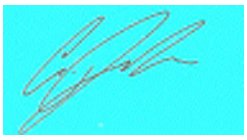
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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APPENDIX B2: MARCH 2019

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NEWCASTLE OFFICE

13 April 2019
Document Ref: NCA19R-WSS190413

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Water quality monitoring results at Cabbage Tree Road Sand Quarry – March 2019 monitoring

Please find enclosed the Water quality monitoring results at Cabbage Tree Road Sand Quarry for the March 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The March monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 and 15 March 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The March 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 was dry); and
- Surface water sampling from 1 location (SW1, SW2 and SW4 were dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of initial Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	9	0	0	0	0
Hydrocarbons**	9	1	1	2	1
Metals***	9	1	1	2	1
Iron (dissolved)	9	1	1	2	1
Total Dissolved Solids (TDS)	10	0	0	0	0
Total Suspended Solids (TSS)	10	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	2	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Comment
BH1	8.64	6.145	2.495	8.12	Well recently reinstated. Strong acrylic odour when gauging. Light brown in colour.
BH2	7.79	5.184	2.606	8.93	Dark brown – No Odour.
BH3	7.57	6.146	1.544	8.75	No odour – No sample taken.
BH4	3.06	2.091	0.969	5.92	Light Brown – No Odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Comment
BH5	7.36	6.146	1.214	8.63	Slight sulfur odour – No sample taken.
BH6	3.62	1.913	1.707	4.44	Brown – No Odour.
BH7	2.98	2.015	0.965	4.42	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.864	1.016	6.09	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.181	3.02	5.21	Light Brown – Slight Odour.
BH12	8.67	6.924	1.746	8.03	40mm inner tube installed. No odour – No sample taken
MW239S	3.04	1.615	1.425	3.89	Dark Brown - Slight Sulfur odour.
MW239D	3.04	1.591	1.449	20.19	No odour – No sample taken
SW01*	2.5	Dry	-	N/A	Location was dry.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	1.1	1	N/A	Water was at a low level and was not seen to be flowing.
SW04*	2	Dry	-	N/A	Location was dry.

* Surface water levels measured from measuring tape installed

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	0830	18.93	111	5.49	81
BH02	0915	19.35	101	4.49	264
BH04	0950	18.92	79	4.52	311
BH06	1415	23.17	159	4.74	178
BH07	1330	25	251	4.34	179
BH08	1300	21.54	307	4.96	176
BH11	0745	18.87	168	4.95	176
MW239S	1445	23.1	323	4.43	179
SW03	1515	25.87	342	6.08	10

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	0.01	9	9	64	No	Similar
	Sulphate	1	9	<1.0	44	No	Similar
	Chloride	1	9	18	126	No	Similar
	Fluoride	0.1	9	<0.1	<1.0	No	Similar
	Reactive Phosphorous	0.01	0	-	-	-	N/A
	Total Phosphorous	0.01	0	-	-	-	N/A
	Nitrite	0.01	0	-	-	-	N/A
	Nitrate	0.01	0	-	-	-	N/A
	Ammonia	0.01	0	-	-	-	N/A
	Total Nitrogen	0.1	0	-	-	-	N/A
	Total Hardness	1	9	5.0	40	No	Similar
	Total Dissolved Solids	1	9	50	266	No	Similar
	pH	0.01	9	4.71	5.67	All outside All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	9	<0.001	0.006		
	B	0.005-0.1	9	<0.05	<0.05	No	Similar
	Ba	0.005-0.1	9	0.003	0.027	No	Similar
	Be	0.005-0.1	9	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	9	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	9	<0.001	0.004	1 above ANZECC 2000 Trigger Values[2]	Similar – Note BH1 that exceeded the criteria was not previously sampled
	Co	0.005-0.1	9	<0.001	0.003	No	Similar
	Cu	0.005-0.1	9	<0.001	0.003	1 above ANZECC 2000 Trigger Values[2]	Similar
	Fe	0.005-0.1	9	0.06	13	7 above drinking water aesthetic criteria	Similar
	Mn	0.005-0.1	9	0.005	0.048	No	Similar
	Ni	0.005-0.1	9	<0.001	0.037	2 above ANZECC 2000 Trigger Values[2], and 2 above NHMRC ADWG 6	Similar
	Pb	0.005-0.1	9	<0.001	<0.001	No	Similar
	Se	0.005-0.1	9	<0.01	<0.01	No	Similar
	V	0.005-0.1	9	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	9	<0.005	1.27	6 above ANZECC 2000 Trigger Values[2]	Similar
	Hg	0.0001	9	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	9	<0.02	1.69	No	Similar – Noting that BH1 was not sampled in the previous monitoring round and the well casing had recently been fixed using a volatile glue. Further consideration will be needed in the next monitoring event.
	>C_{10}-C_{16}	0.1	9	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	9	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	9	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Total >C_{10}-C_{40}	0.1	9	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	9	<0.02	1.69	No	Similar – Noting that BH1 was not sampled in the previous monitoring round and the well casing had recently been fixed using a volatile glue. Further consideration will be needed in the next monitoring event.
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	9	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	9	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Naphthalene	0.001	9	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	10	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	10	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	10	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in March than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0									
2nd	0	12.8	0									
3rd	0	0.4										
4th	0	0	0									
5th	0	0	0									
6th	0	0	0									
7th	5.0	0	8.2									
8th	0	0	0									
9th	0	6.6	0									
10th	0.2	0	12.0									
11th	0	0	0									
12th	3.0	0	0									
13th	0	0	0									
14th	0	0	0									
15th	0	0	0									
16th	0	0	4.8									
17th	0	0	59.4									
18th	0	0	2.6									
19th	0	0	2.2									
20th	2.4		0									
21st	1.0	1.4	0									
22nd	0	1.0	1.2									
23rd	0	1.4	0									
24th	0	9.2	5.4									
25th	0	0	5.2									
26th	0	0	0									
27th	0	0	0									
28th	1.0	0	0									
29th	0		0									
30th	0		38.2									
31st	0		6.6									
Monthly Total	**14.6**	**33.6**	**145.8**									
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.9**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Despite the rainfall in March, based on the long term rainfall data, it is expected that the current groundwater and surface water levels would still be low.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Tom Overton MSc, BSc (Hons), Dip

Senior Project Manager
Contaminated Land Management
toverton@kleinfelder.com

Mobile: 0415 170 312

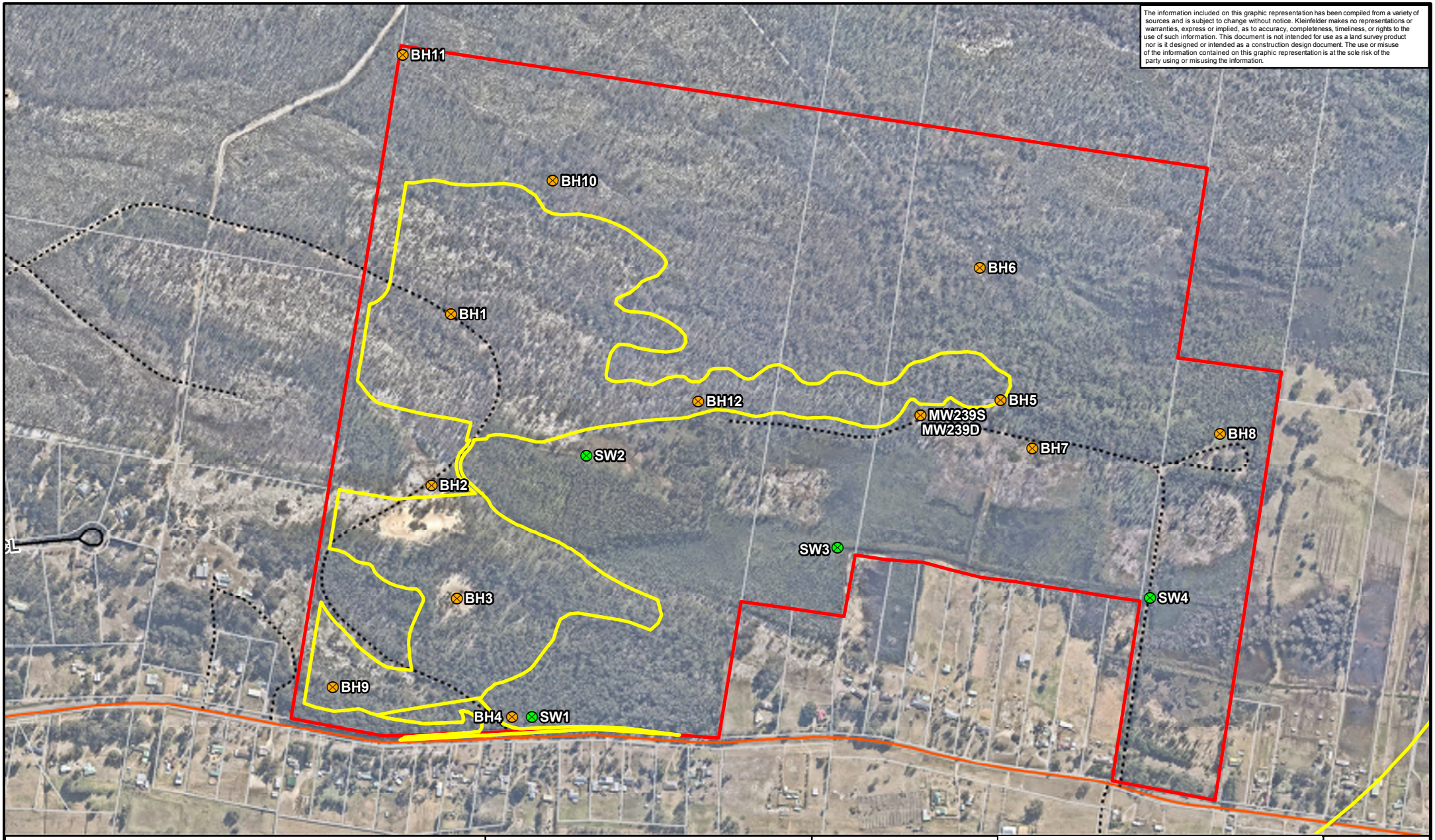
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations February 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table BH01
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH1	387741.2	6369495.8	8.21	8.64	9.45	6.45	8.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	5.776	2.864	8.89	-0.25	-	-	-	-	No water sample taken due to top of well being melted
15/03/2019	6.145	2.495	8.12	0.52	18.93	111	5.49	81	Well recently reinstated. Strong acrylic odour when gauging. Light brown in colour.

Table BH02
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH2	387704.7	6369175.1	7.4	7.79	9.45	5.6	8.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	5.674	2.116	8.93	-1.14	22.7	124.1	4.29	111	Slightly Cloudy, light brown, slight sulfur odour
15/03/2019	5.184	2.606	8.93	-1.14	19.35	101	4.49	264	Dark brown – No Odour.

Table BH03
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH3	387751.7	6368964.3	7.03	7.57	9.45	5.45	8.45	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	6.026	1.544	8.94	-1.37	22.1	82.4	4.54	94	Light Brown - No Odour
14/03/2019	6.146	1.424	8.75	-1.18	-	-	-	-	No odour – No sample taken.

Table BH04
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH4	387854.9	6368742.8	2.81	3.06	6.45	2.65	5.65	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.994	1.066	5.92	-2.86	20.4	129.2	3.85	135	light discolouration - Brown
15/03/2019	2.091	0.969	5.92	-2.86	18.92	79	4.52	311	Light Brown – No Odour.

Table BH05
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH5	388768.5	6369334.7	6.76	7.36	9.28	8.1	5.1	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	6.063	1.297	8.63	-1.27	20.1	320	4.06	122	Roots evident. Brown slight sulfur odour
14/03/2019	6.146	1.214	8.63	-1.27	-	-	-	-	Slight sulfur odour – No sample taken.

Table BH06
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH6	388729.7	6369582.2	3.01	3.62	4.95	3.9	2.4	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.823	1.797	4.43	-0.81	23.1	228	4.28	111	Clear to slightly cloudy, sulfur odour
14/03/2019	1.913	1.707	4.44	-0.82	23.17	159	4.74	178	Brown – No Odour.

Table BH07
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH7*	388827.7	6369245.3	2.6	2.98	4.95	2.6	4.1	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.938	1.042	4.42	-1.44	23.7	283	4.04	125	Slightly Cloudy, light brown, slight sulfur odour
14/03/2019	2.015	0.965	4.42	-1.44	25	251	4.34	179	Slightly Cloudy, light brown, slight sulfur odour.

Table BH08
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH8	389178.2	6369271.6	3.28	3.88	6.28	3	5.5	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	2.78	1.1	6.08	-2.2	21.8	411	4.09	121	Sulfur smell - Dark Brown
14/03/2019	2.864	1.016	6.09	-2.21	21.54	307	4.96	176	Sulfur smell - cloudy

Table BH09
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH9	387520.4	6368798.8	17.07	17.75	18.18	14.6	17.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	15.82	1.93	-	-	-	-	Well was dry
14/03/2019	Dry	-	16.01	1.74	-	-	-	-	Well was dry

Table BH10
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH10	387931.2	6369744.4	6.09	6.69	5.45	2	5	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	3.58	3.11	-	-	-	-	Well was dry
14/03/2019	Dry	-	3.58	3.11	-	-	-	-	Well was dry

Table BH11
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH11	387650.6	6369979.7	6.02	6.63	5.95	1.6	4.6	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	3.02	3.61	5.21	1.42	22.3	402	3.78	136	Brown - No Odour
15/03/2019	3.181	3.449	5.21	1.42	18.87	168	4.95	176	Light Brown – Slight Odour.

Table BH12
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
BH12	388202.9	6369332.9	8.06	8.67	8.39	4.8	7.8	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	Dry	-	6.166	2.504	-	-	-	-	Well was dry
14/03/2019	6.924	1.746	8.03	0.64	-	-	-	-	40mm inner tube installed. No odour – No sample taken

Table BH239S
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
MW239S	388619.1	-	2.98	3.04	4	1	4	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.529	1.511	3.89	-0.85	21.7	526	4.09	121	Light Brown - Slight Sulfur odour
14/03/2019	1.615	1.425	3.89	-0.85	23.1	323	4.43	179	Dark Brown - Slight Sulfur odour.

Table BH239D
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Borehole	Easting (MGA)	Northing (MGA)	Ground Surface RL (mAHD)	Top of Casing (mAHD)	Bore Depth prior to monitoring (mBTOC)	Screen Top (mBG)	Screen Bottom (mBG)	Well Diameter (mm)
MW239D	388619.1	-	2.98	3.04	21	-	-	50

Date	Depth to Water (mBTOC)	Water Elevation (mAHD)	Well Total Depth at point of sampling (mBTOC)	Well Base Elevation (mAHD)	Description
21/02/2019	1.312	1.728	20.21	-17.17	
14/03/2019	1.591	1.449	20.19	-17.15	

Table SW01
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW01	387886.7	6368734	2.5

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	2.5	-	-	-	-	No water present
14/03/2019	0	2.5					No water present

Table SW02
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW02	387988.3	6369234	3.3

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	3.3	-	-	-	-	No water present
14/03/2019	0	3.3	-	-	-	-	No water present

Table SW03
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW03	388464.6	6369057	2.1

Date	Water Level (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	1.1	1	26	313	5.11	62	Water level low, slight sulfur odour
14/03/2019	1.1	1	25.87	342	6.08	10	Water was at a low level and was not seen to be flowing.

Table SW04
Groundwater gauging data and field parameters
Williamtown Sand Syndicate

Location	Easting (MGA)	Northing (MGA)	Top of Measuring Tape (mAHD)
SW04	389049	6368969	2

Date	Water Lavel (Reading on tape)	Water Elevation (mAHD)	Temp (°C)	EC (us/cm)	pH	Redox (mV)	Description
21/02/2019	0	2	-	-	-	-	No water present
14/03/2019	0	2	-	-	-	-	No water present

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW2395	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
BH11	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
BH2	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
BH4	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
BH6	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
BH7	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
BH8	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
MW2395	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
MW239S	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
SW3	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Analyte		Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6											0.56																		0.07		
HEPA NEMP 2018***						0.00023					19																				
HEPA NEMP 2018[4]											5.6																		0.7		
Sample Name	Sample Date																														
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																	Alkalinity						Inorganics			
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*														6.5 - 8.0*
NHMRC ADWG 6		180[2]				250[3]	250[3]	1.5			3	50		0.5[2]											200[3]		600[2]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	**11**	**2.0**	**1.0**	< 1.0	< 1.0	**25**	< 0.1									**0.66**	**0.88**	-		**9.0**	< 1.0	< 1.0	**9.0**	**9.0**	**104**	**68**	**129**	**5.67**
BH11	21-Feb-19	**48**	< 1.0	**10**	< 1.0	**24**	**80**	**0.1**	< 0.01	**0.03**	< 0.01	**0.04**	**0.04**	**0.06**	**1.8**	**1.8**	**2.91**	**2.76**	-	**3.21**	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**346**	**278**		**4.67**
BH11	15-Mar-19	**26**	< 1.0	**2.0**	< 1.0	**2.0**	**52**	< 0.1									**1.3**	**1.51**	-		< 1.0	< 1.0	< 1.0	< 1.0	**8.0**	**186**	**121**	**144**	**4.82**
BH2	22-Feb-19	**12**	**2.0**	**2.0**	< 1.0	**6.0**	**22**	**0.1**	< 0.01	**0.28**	< 0.01	**2.76**	**2.76**	**0.05**	**4.0**	**1.2**	**0.79**	**0.74**	-	**1.44**	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**91**	**128**		**4.87**
BH2	15-Mar-19	**10**	**3.0**	**2.0**	< 1.0	**7.0**	**23**	< 0.1									**0.75**	**0.79**	-		< 1.0	< 1.0	< 1.0	< 1.0	**16**	**101**	**66**	**90**	**4.71**
BH3	21-Feb-19	**4.0**	**4.0**	**1.0**	< 1.0	**4.0**	**10**	< 0.1	< 0.01	**2.76**	< 0.01	**0.78**	**0.78**	**0.3**	**5.9**	**5.1**	**0.46**	**0.54**	-	**0.46**	**9.0**	< 1.0	< 1.0	**9.0**	**14**	**60**	**438**		**5.55**
BH4	21-Feb-19	**8.0**	**2.0**	**1.0**	**1.0**	**5.0**	**17**	< 0.1	< 0.01	**0.19**	< 0.01	**0.35**	**0.35**	**0.04**	**0.6**	**0.3**	**0.56**	**0.7**	-	**1.15**	**6.0**	< 1.0	< 1.0	**6.0**	**9.0**	**73**	**96**		**5.4**
BH4	15-Mar-19	**9.0**	**2.0**	< 1.0	< 1.0	**5.0**	**18**	< 0.1									**0.49**	**0.61**	-		< 1.0	< 1.0	< 1.0	< 1.0	**5.0**	**77**	**50**	**70**	**5.12**
BH5	22-Feb-19	**42**	< 1.0	**6.0**	**1.0**	**19**	**69**	**0.2**	< 0.01	**0.34**	< 0.01	< 0.01	< 0.01	**0.09**	**3.0**	**3.0**	**2.35**	**2.34**	-	**3.59**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**250**	**211**		**4.87**
BH6	22-Feb-19	**28**	**3.0**	**4.0**	**1.0**	**28**	**42**	< 0.1	< 0.01	**0.05**	< 0.01	**0.09**	**0.09**	**0.14**	**0.5**	**0.4**	**1.72**	**1.77**	-	**2.49**	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**177**	**144**		**4.37**
BH6	14-Mar-19	**23**	**2.0**	**4.0**	**1.0**	**17**	**37**	< 0.1									**1.46**	**1.44**	-		**2.0**	< 1.0	< 1.0	**2.0**	**21**	**179**	**116**	**146**	**4.95**
BH7	22-Feb-19	**34**	< 1.0	**5.0**	**2.0**	**12**	**64**	**0.2**	< 0.01	**0.13**	< 0.01	**0.02**	**0.02**	**0.34**	**2.2**	**2.2**	**1.94**	**2.06**	-	**3.16**	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**213**	**196**		**4.76**
BH7	14-Mar-19	**36**	< 1.0	**6.0**	**2.0**	**16**	**61**	< 0.1									**2.11**	**2.05**	**1.37**		< 1.0	< 1.0	< 1.0	< 1.0	**25**	**271**	**176**	**212**	**4.73**
BH8	21-Feb-19	**52**	< 1.0	**6.0**	< 1.0	**11**	**90**	< 0.1	< 0.01	**1.97**	< 0.01	< 0.01	< 0.01	**0.5**	**2.4**	**2.4**	**2.76**	**2.77**	-	**4.44**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**352**	**258**		**4.46**
BH8	14-Mar-19	**45**	< 1.0	**6.0**	< 1.0	**6.0**	**76**	< 0.1									**2.45**	**2.27**	-		< 1.0	< 1.0	< 1.0	< 1.0	**25**	**319**	**207**	**253**	**4.77**
MW2395	22-Feb-19	**61**	< 1.0	**6.0**	< 1.0	**6.0**	**104**	< 0.1	< 0.01	**0.56**	< 0.01	< 0.01	< 0.01	**0.18**	**3.9**	**3.9**	**3.15**	**3.06**	**1.43**	**5.21**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**329**	**234**		**4.89**
MW2395	14-Mar-19	**64**	< 1.0	**6.0**	< 1.0	**2.0**	**126**	< 0.1									**3.28**	**3.64**	**5.18**		**2.0**	< 1.0	< 1.0	**2.0**	**25**	**410**	**266**	**232**	**5.02**
SW3	22-Feb-19	**40**	**4.0**	**4.0**	**1.0**	**16**	**82**	< 0.1	< 0.01	**0.06**	< 0.01	< 0.01	< 0.01	**0.16**	**1.0**	**1.0**	**2.55**	**2.87**	-	**3.38**	**11**	< 1.0	< 1.0	**11**	**26**	**262**	**228**		**6.21**
SW3	14-Mar-19	**45**	**6.0**	**6.0**	**2.0**	**44**	**64**	< 0.1									**2.8**	**2.8**	-		**4.0**	< 1.0	< 1.0	**4.0**	**40**	**344**	**224**	**279**	**5.42**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons						Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silcia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{16} - C_{34} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluorosulfonyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_130219	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_150319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1907792**	Page	: 1 of 16
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 14-Mar-2019 16:46
Order number	:	Date Analysis Commenced	: 15-Mar-2019
C-O-C number	: ----	Issue Date	: 20-Mar-2019 18:29
Sampler	: Dan Kousbroek		
Site	: WSS - Cabbage Tree Rd water monitoring		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020: Positive result for sample ES1907792 - #009 has been confirmed by redigestion and reanalysis.
- EG020: Filtered Iron Results for samples ES1907792-#005 and #008 have been confirmed by reanalysis.
- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
			Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	----	5.42	----	5.02	4.73
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	344	----	410	271
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	279	----	232	212
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	----	224	----	266	176
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	34	----	504	149
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	----	40	----	25	25
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	4	----	2	<1
Total Alkalinity as CaCO3	----	1	mg/L	----	4	----	2	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	44	----	2	16
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	64	----	126	61
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	6	----	<1	<1
Magnesium	7439-95-4	1	mg/L	----	6	----	6	6
Sodium	7440-23-5	1	mg/L	----	45	----	64	36
Potassium	7440-09-7	1	mg/L	----	2	----	<1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	0.006	----	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	----	<0.001	----	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	----	0.080	----	0.008	0.010
Cadmium	7440-43-9	0.0001	mg/L	----	<0.0001	----	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	----	<0.001	----	0.002	0.001
Copper	7440-50-8	0.001	mg/L	----	<0.001	----	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	----	0.003	----	<0.001	0.003

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L		----	**0.002**	----	**0.005**	**0.004**
Lead	7439-92-1	0.001	mg/L		----	<0.001	----	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		----	**0.009**	----	**0.008**	**0.009**
Manganese	7439-96-5	0.001	mg/L		----	**0.048**	----	**0.005**	**0.020**
Selenium	7782-49-2	0.01	mg/L		----	<0.01	----	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		----	<0.01	----	<0.01	<0.01
Boron	7440-42-8	0.05	mg/L		----	<0.05	----	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		----	**9.26**	----	**1.25**	**1.80**
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	<0.001	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	<0.001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	<0.01	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		<0.05	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	<0.1	----	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	**2.80**	----	**3.64**	**2.05**
Total Cations	----	0.01	meq/L		----	**2.80**	----	**3.28**	**2.11**
Ionic Balance	----	0.01	%		----	----	----	**5.18**	**1.37**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	<0.02	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate02	SW3	Trip Blank	MW239S	BH7
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	13-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-001	ES1907792-002	ES1907792-003	ES1907792-004	ES1907792-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	<0.05	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	<0.05	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	<0.05	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	<0.05	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	<0.01	----	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	<0.01	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.6**	**100**	**87.2**	**87.1**	**86.5**
Toluene-D8	2037-26-5	2	%		**105**	**104**	**101**	**98.4**	**92.1**
4-Bromofluorobenzene	460-00-4	2	%		**102**	**102**	**98.4**	**98.3**	**90.0**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	----	**105**	----	**105**
13C8-PFOA	----	0.02	%		**91.1**	----	**97.3**	----	**92.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
			Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit	ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.95	4.77	----	----	5.12
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	179	319	----	----	77
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	146	253	----	----	70
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	116	207	----	----	50
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	144	138	----	----	45
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	21	25	----	----	5
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	<1	----	----	<1
Total Alkalinity as CaCO3	----	1	mg/L	2	<1	----	----	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	6	----	----	5
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	37	76	----	----	18
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	2	<1	----	----	2
Magnesium	7439-95-4	1	mg/L	4	6	----	----	<1
Sodium	7440-23-5	1	mg/L	23	45	----	----	9
Potassium	7440-09-7	1	mg/L	1	<1	----	----	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	<0.001
Barium	7440-39-3	0.001	mg/L	0.027	0.006	0.010	----	0.014
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.001	----	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.002	----	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.002**	**0.004**	----	**0.022**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.012**	<0.005	**0.007**	----	**0.043**
Manganese	7439-96-5	0.001	mg/L		**0.010**	**0.008**	**0.021**	----	**0.014**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	<0.01
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	<0.05
Iron	7439-89-6	0.05	mg/L		**1.90**	**3.25**	**2.51**	----	<0.05
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	----	----	<0.001	----
Beryllium	7440-41-7	0.001	mg/L		----	----	----	<0.001	----
Barium	7440-39-3	0.001	mg/L		----	----	----	**0.002**	----
Cadmium	7440-43-9	0.0001	mg/L		----	----	----	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		----	----	----	<0.001	----
Copper	7440-50-8	0.001	mg/L		----	----	----	<0.001	----
Cobalt	7440-48-4	0.001	mg/L		----	----	----	<0.001	----
Nickel	7440-02-0	0.001	mg/L		----	----	----	<0.001	----
Lead	7439-92-1	0.001	mg/L		----	----	----	<0.001	----
Zinc	7440-66-6	0.005	mg/L		----	----	----	<0.005	----
Manganese	7439-96-5	0.001	mg/L		----	----	----	<0.001	----
Selenium	7782-49-2	0.01	mg/L		----	----	----	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		----	----	----	<0.01	----
Boron	7440-42-8	0.05	mg/L		----	----	----	<0.05	----
Iron	7439-89-6	0.05	mg/L		----	----	----	<0.05	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	<0.0001
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		----	----	----	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	----	----	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**1.44**	**2.27**	----	----	**0.61**
Total Cations	----	0.01	meq/L		**1.46**	**2.45**	----	----	**0.49**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH8	Dup02	TRIP BLANK02	BH4
				Client sampling date / time	14-Mar-2019 00:00	14-Mar-2019 00:00	14-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00
Compound	CAS Number	LOR	Unit		ES1907792-006	ES1907792-007	ES1907792-008	ES1907792-009	ES1907792-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**90.7**	**103**	**95.6**	**----**	**95.5**
Toluene-D8	2037-26-5	2	%		**107**	**109**	**102**	**----**	**97.7**
4-Bromofluorobenzene	460-00-4	2	%		**104**	**106**	**99.2**	**----**	**95.4**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**106**	**118**	**107**	**87.4**	**84.5**
13C8-PFOA	----	0.02	%		**94.3**	**117**	**91.7**	**86.9**	**88.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH1	BH11	BH2	----	----
			Client sampling date / time	15-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1907792-011	ES1907792-012	ES1907792-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.67**	**4.82**	**4.71**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**104**	**186**	**101**	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**129**	**144**	**90**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**68**	**121**	**66**	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**78**	**152**	**352**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**9**	**8**	**16**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**9**	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**9**	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**2**	**7**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**25**	**52**	**23**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**2**	<1	**3**	----	----
Magnesium	7439-95-4	1	mg/L	**1**	**2**	**2**	----	----
Sodium	7440-23-5	1	mg/L	**11**	**26**	**10**	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Barium	7440-39-3	0.001	mg/L	**0.003**	**0.005**	**0.004**	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.004**	**0.001**	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	**0.003**	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH11	BH2	----	----
				Client sampling date / time	15-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1907792-011	ES1907792-012	ES1907792-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.037**	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L		**1.27**	**0.016**	<0.005	----	----
Manganese	7439-96-5	0.001	mg/L		**0.014**	**0.007**	**0.020**	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Iron	7439-89-6	0.05	mg/L		**12.5**	**1.49**	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**0.88**	**1.51**	**0.79**	----	----
Total Cations	----	0.01	meq/L		**0.66**	**1.30**	**0.75**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		**1710**	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		**1690**	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		**1690**	<20	<20	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH11	BH2	----	----
				Client sampling date / time	15-Mar-2019 00:00	15-Mar-2019 00:00	15-Mar-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1907792-011	ES1907792-012	ES1907792-013	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**87.1**	**85.0**	**86.4**	----	----
Toluene-D8	2037-26-5	2	%		**99.8**	**103**	**102**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**101**	**101**	**98.5**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1907792**	Page	: 1 of 23
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 14-Mar-2019
Order number	:	Date Analysis Commenced	: 15-Mar-2019
C-O-C number	: ----	Issue Date	: 20-Mar-2019
Sampler	: Dan Kousbroek		
Site	: WSS - Cabbage Tree Rd water monitoring		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA005P: pH by PC Titrator (QC Lot: 2237878)									
ES1907554-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.79	7.83	0.512	0% - 20%
ES1907792-005	BH7	EA005-P: pH Value	----	0.01	pH Unit	4.73	4.71	0.424	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2240085)									
ES1907792-010	BH4	EA005-P: pH Value	----	0.01	pH Unit	5.12	4.92	3.98	0% - 20%
ES1907958-009	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.38	8.51	1.54	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2237879)									
ES1907554-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	382	379	0.808	0% - 20%
ES1907792-005	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	271	270	0.381	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2240084)									
ES1907903-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	147	147	0.00	0% - 20%
ES1907792-010	BH4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	77	78	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2238874)									
ES1907792-002	SW3	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	279	288	3.35	0% - 20%
ES1907850-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	427	411	3.82	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2238875)									
ES1907792-002	SW3	EA025H: Suspended Solids (SS)	----	5	mg/L	34	37	9.25	No Limit
ES1907850-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	7	8	13.8	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2237880)									
ES1907770-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	39	40	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	39	40	0.00	0% - 20%
ES1907554-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2237880) - continued									
ES1907554-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	225	228	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	225	228	1.64	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2237881)									
ES1907853-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	402	387	3.96	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	402	387	3.96	0% - 20%
ES1907792-005	BH7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2240087)									
ES1907903-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	29	30	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	29	30	0.00	0% - 20%
ES1907792-010	BH4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2238032)									
ES1906768-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	100	104	3.35	0% - 20%
ES1907792-004	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	3	42.3	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2239183)									
ES1907792-010	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ES1907887-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	<5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2238033)									
ES1906768-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ES1907792-004	MW239S	ED045G: Chloride	16887-00-6	1	mg/L	126	130	3.30	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2239182)									
ES1907792-010	BH4	ED045G: Chloride	16887-00-6	1	mg/L	18	18	0.00	0% - 50%
ES1907887-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	55	49	11.3	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2237747)									
ES1907567-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	306	307	0.346	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
ES1907850-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	94	96	1.74	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	34	35	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 2237747) - continued									
ES1907850-001	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	6	6	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2239711)									
ES1907524-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	29	29	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	23	23	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	7	0.00	No Limit
ES1907958-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	339	346	2.13	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	230	232	0.954	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	833	838	0.630	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	38	39	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2237745)									
ES1907496-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.032	0.032	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.014	0.013	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	1.08	1.08	0.284	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.013	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.074	0.075	0.00	0% - 50%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1907850-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.015	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2237745) - continued									
ES1907850-001	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2239713)									
ES1907524-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.047	0.047	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.015	0.016	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.161	0.159	1.04	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.13	0.00	No Limit
ES1907958-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.178	0.183	2.56	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.006	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.481	0.491	1.92	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.07	0.07	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2238334)									
ES1907779-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.017	0.018	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 2238334) - continued									
ES1907779-001	Anonymous	EG020A-T: Copper	7440-50-8	0.001	mg/L	0.012	0.011	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
ME1900358-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.106	0.104	2.40	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.223	0.220	1.20	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.036	0.035	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.060	0.058	4.14	0% - 50%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.42	0.42	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2239684)									
ES1906769-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.156	0.162	3.90	0% - 20%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.068	0.072	4.98	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.196	0.200	2.32	0% - 20%
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.08	0.08	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020T: Total Metals by ICP-MS (QC Lot: 2239684) - continued									
ES1907548-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Barium	7440-39-3	0.001	mg/L	0.007	0.008	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Manganese	7439-96-5	0.001	mg/L	0.042	0.042	0.00	0% - 20%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.33	0.33	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2237744)									
ES1907496-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1907478-007	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2239712)									
ES1907792-008	Dup02	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2239914)									
ES1907554-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1907903-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2237877)									
ES1907554-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.00	No Limit
ES1907792-005	BH7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2240086)									
ES1907903-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1907792-010	BH4	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1907792-010	BH4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1907792-010	BH4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2239738)									
EB1906198-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2239738) - continued									
EB1906198-001	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1907792-010	BH4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2238646) - continued									
EM1903562-018	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2240355) - continued									
ES1907991-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2240355) - continued									
EM1903562-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907847-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2240355) - continued									
EM1903562-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2238646)									
EM1903562-018	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1907847-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.01	0.01	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2240355)									
EM1903562-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.05	0.05	0.00	No Limit
ES1907991-009	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2237878)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.8	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2240085)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	98.8	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2237879)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	102	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2240084)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	96.1	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2238874)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	87	109
				<10	293 mg/L	118	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2238875)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	109	83	129
				<5	1000 mg/L	96.6	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2237880)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	81	111
				----	50 mg/L	113	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2237881)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	81	111
				----	50 mg/L	107	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 2240087)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	103	81	111
				----	50 mg/L	104	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2238032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.2	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2239183)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.0	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2238033)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.0	81	127
				<1	1000 mg/L	102	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2239182)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 2239182) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	117	81	127
				<1	1000 mg/L	101	81	127
ED093F: Dissolved Major Cations (QCLot: 2237747)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.7	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.5	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.3	85	113
ED093F: Dissolved Major Cations (QCLot: 2239711)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	113	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.8	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.3	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.3	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2237745)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.1	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	97.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	95.0	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	86.3	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	95.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.9	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	85.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.7	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	100	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.7	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	86.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.5	82	112
EG020T: Total Metals by ICP-MS (QCLot: 2238334)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	82	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	79	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	84	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	86	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	106	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.0	85	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	108	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.9	84	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.5	68	126
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	79	117
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	104	75	129
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	106	85	117
EG020T: Total Metals by ICP-MS (QCLot: 2239684)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	82	114
EG020A-T: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.4	79	119
EG020A-T: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.4	84	116
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.2	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.1	86	116
EG020A-T: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	98.0	84	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.9	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.4	85	115
EG020A-T: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.4	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	84	116
EG020A-T: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	68	126
EG020A-T: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	85	113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.2	79	117
EG020A-T: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.0	75	129
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.4	85	117

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG035F: Dissolved Mercury by FIMS (QCLot: 2237744)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.2	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2239712)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.5	83	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2239914)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	77	111
EK040P: Fluoride by PC Titrator (QCLot: 2237877)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	102	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2240086)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	85.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2237202)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	102	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.4	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	103	71	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2239313)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	88.7	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	92.9	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	107	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2237202)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.7	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	97.3	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	93.4	65	127
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2239313)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	85.5	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	84.6	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.7	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2239738)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	89.8	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2239738)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.7	75	127
EP080: BTEXN (QCLot: 2239738)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.6	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	91.0	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.4	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	88.8	70	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2238646)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	92.4	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	100	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2240355)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	76.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	70.2	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	71.6	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	80.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	70.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	78.2	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2238646)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	106	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	106	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	126	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	91.4	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	80.6	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	78.6	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	81.4	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	74.2	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	72.8	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	73.2	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	77.8	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	75.8	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	73.0	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646) - continued								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	121	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	104	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	112	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2240355)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	77.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	82.8	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	75.6	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	75.4	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	83.1	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	75.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	77.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2238646)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	108	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	113	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	115	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	110	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2240355)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	73.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	75.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	87.2	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	85.6	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2238032)							
ES1906768-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2239183)							
ES1907792-010	BH4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	110	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2238033)							
ES1906768-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	112	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2239182)							
ES1907792-010	BH4	ED045G: Chloride	16887-00-6	250 mg/L	126	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2237745)							
ES1907567-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	99.8	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	130	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	92.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	86.3	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	123	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	97.9	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	98.8	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	109	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.9	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	124	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	77.1	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2239713)							
ES1907792-008	Dup02	EG020A-F: Arsenic	7440-38-2	1 mg/L	125	70	130
		EG020A-F: Beryllium	7440-41-7	2 mg/L	87.6	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	128	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	130	70	130
		EG020A-F: Chromium	7440-47-3	2 mg/L	83.8	70	130
		EG020A-F: Cobalt	7440-48-4	2 mg/L	79.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	124	70	130
		EG020A-F: Lead	7439-92-1	2 mg/L	72.0	70	130
		EG020A-F: Manganese	7439-96-5	2 mg/L	81.6	70	130
		EG020A-F: Nickel	7440-02-0	2 mg/L	86.4	70	130
		EG020A-F: Vanadium	7440-62-2	2 mg/L	83.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	121	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2238334)							
ES1907792-001	Rinsate02	EG020A-T: Arsenic	7440-38-2	1 mg/L	101	70	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	102	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 2238334) - continued							
ES1907792-001	Rinsate02	EG020A-T: Barium	7440-39-3	1 mg/L	103	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	105	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	111	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	109	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	113	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	108	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	102	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	70	130
EG020T: Total Metals by ICP-MS (QCLot: 2239684)							
ES1906769-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	106	70	130
		EG020A-T: Beryllium	7440-41-7	1 mg/L	129	70	130
		EG020A-T: Barium	7440-39-3	1 mg/L	100	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	100	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	127	70	130
		EG020A-T: Cobalt	7440-48-4	1 mg/L	130	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	101	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	105	70	130
		EG020A-T: Manganese	7439-96-5	1 mg/L	126	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	106	70	130
		EG020A-T: Vanadium	7440-62-2	1 mg/L	130	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	96.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2237744)							
ES1907478-007	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	94.1	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2239712)							
ES1907524-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	102	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2239914)							
ES1907792-001	Rinsate02	EG035T: Mercury	7439-97-6	0.01 mg/L	119	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2237877)							
ES1907554-001	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	94.4	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2240086)							
ES1907792-010	BH4	EK040P: Fluoride	16984-48-8	5 mg/L	85.2	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2239738)							
EB1906198-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	102	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2239738)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2239738) - continued							
EB1906198-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	101	70	130
EP080: BTEXN (QCLot: 2239738)							
EB1906198-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.9	70	130
		EP080: Toluene	108-88-3	25 µg/L	95.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	91.2	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	93.5	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.7	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	87.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	96.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	95.8	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	105	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	98.2	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	108	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	71.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	68.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	80.6	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	92.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	78.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	91.2	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	107	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	102	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	106	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	109	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	104	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	108	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	102	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	106	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	86.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	97.8	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	110	50	150
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	79.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	89.6	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2240355) - continued							
EM1903562-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	81.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	76.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	78.6	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	85.6	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	85.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	70.4	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	100	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	117	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	108	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	104	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	104	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	114	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	84.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	95.8	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	86.8	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	77.0	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	93.8	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	87.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	82.4	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2238646)							
EM1903562-018	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	119	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	98.8	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2240355)							
EM1903562-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	71.8	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	80.6	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	105	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	100	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1907792**	Page	: 1 of 13
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Telephone	: +6138549 9630
Project	: 20190803	Date Samples Received	: 14-Mar-2019
Site	: WSS - Cabbage Tree Rd water monitoring	Issue Date	: 20-Mar-2019
Sampler	: Dan Kousbroek	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1906768--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
SW3,	MW239S,	----	----	----	15-Mar-2019	14-Mar-2019	**1**
BH7,	BH6,						
BH8							
Clear Plastic Bottle - Natural							
BH4,	BH1,	----	----	----	18-Mar-2019	15-Mar-2019	**3**
BH11,	BH2						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	14-Mar-2019	×
Clear Plastic Bottle - Natural (EA005-P)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	15-Mar-2019	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Natural (EA010-P)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**16-Mar-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EA015H)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**16-Mar-2019**	22-Mar-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**16-Mar-2019**	21-Mar-2019	✓
Clear Plastic Bottle - Natural (EA025H)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**16-Mar-2019**	22-Mar-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	28-Mar-2019	✓
Clear Plastic Bottle - Natural (ED037-P)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	29-Mar-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Natural (ED041G)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**16-Mar-2019**	12-Apr-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Natural (ED045G)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**16-Mar-2019**	12-Apr-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	10-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
Dup02	**14-Mar-2019**	**----**	----	----	**18-Mar-2019**	10-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	11-Sep-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
Trip Blank	**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**15-Mar-2019**	09-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
Rinsate02	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**15-Mar-2019**	10-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)							
TRIP BLANK02	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**----**	----	----	**18-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
Trip Blank	**13-Mar-2019**	**----**	----	----	**18-Mar-2019**	10-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
Rinsate02	**14-Mar-2019**	**----**	----	----	**18-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)							
TRIP BLANK02	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
SW3, MW239S, BH7, BH6, BH8	**14-Mar-2019**	**----**	----	----	**15-Mar-2019**	11-Apr-2019	✓
Clear Plastic Bottle - Natural (EK040P)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**----**	----	----	**18-Mar-2019**	12-Apr-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**15-Mar-2019**	21-Mar-2019	✓	**18-Mar-2019**	24-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**18-Mar-2019**	22-Mar-2019	✓	**20-Mar-2019**	27-Apr-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**15-Mar-2019**	21-Mar-2019	✓	**18-Mar-2019**	24-Apr-2019	✓
Amber Glass Bottle - Unpreserved (EP071SG)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**18-Mar-2019**	22-Mar-2019	✓	**20-Mar-2019**	27-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
Trip Blank	**13-Mar-2019**	**18-Mar-2019**	27-Mar-2019	✓	**18-Mar-2019**	27-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**18-Mar-2019**	28-Mar-2019	✓	**18-Mar-2019**	28-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**18-Mar-2019**	29-Mar-2019	✓	**18-Mar-2019**	29-Mar-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
Trip Blank	**13-Mar-2019**	**18-Mar-2019**	27-Mar-2019	✓	**18-Mar-2019**	27-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**18-Mar-2019**	28-Mar-2019	✓	**18-Mar-2019**	28-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**18-Mar-2019**	29-Mar-2019	✓	**18-Mar-2019**	29-Mar-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
Trip Blank	**13-Mar-2019**	**18-Mar-2019**	27-Mar-2019	✓	**18-Mar-2019**	27-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
Rinsate02, SW3, MW239S, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**18-Mar-2019**	28-Mar-2019	✓	**18-Mar-2019**	28-Mar-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
BH4, BH1, BH11, BH2	**15-Mar-2019**	**18-Mar-2019**	29-Mar-2019	✓	**18-Mar-2019**	29-Mar-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
Trip Blank		**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**18-Mar-2019**	09-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
Rinsate02, BH6, Dup02	BH7, BH8,	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**18-Mar-2019**	10-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
TRIP BLANK02,	BH4	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
Trip Blank		**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**18-Mar-2019**	09-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
Rinsate02, BH6, Dup02	BH7, BH8,	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**18-Mar-2019**	10-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
TRIP BLANK02,	BH4	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
Trip Blank		**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**18-Mar-2019**	09-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
Rinsate02, BH6, Dup02	BH7, BH8,	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**18-Mar-2019**	10-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
TRIP BLANK02,	BH4	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
Trip Blank		**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**18-Mar-2019**	09-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
Rinsate02, BH6, Dup02	BH7, BH8,	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**18-Mar-2019**	10-Sep-2019	✓
HDPE (no PTFE) (EP231X)								
TRIP BLANK02,	BH4	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
Trip Blank	**13-Mar-2019**	**15-Mar-2019**	09-Sep-2019	✓	**18-Mar-2019**	09-Sep-2019	✓
HDPE (no PTFE) (EP231X)							
Rinsate02, BH7, BH6, BH8, Dup02	**14-Mar-2019**	**15-Mar-2019**	10-Sep-2019	✓	**18-Mar-2019**	10-Sep-2019	✓
HDPE (no PTFE) (EP231X)							
TRIP BLANK02, BH4	**15-Mar-2019**	**18-Mar-2019**	11-Sep-2019	✓	**18-Mar-2019**	11-Sep-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	6	60	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	28	**10.71**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	6	60	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	13	**15.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Dissolved Mercury by FIMS	EG035F	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	2	13	**15.38**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	28	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

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Page 1 of 1

COC number:

KLEINFELDER
Bright People. Right Solutions.

Please Refer to WO # ES1907792

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676	
	Job No.:	20190803	Contact e-mail:	dkousbroek@kleinfelder.com	
	Required TAT:	24 hrs 48 hrs 3 days **5 days** 7 days	PM name (if not sampler):	Tom Overton	
	Data QA level:	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com	

CHAIN OF CUSTODY						Send Results to:
Relinquished by (print): D. Kousbroek (sign)		Received by (print): C. Sullivan (sign)		Relinquished: C. Sullivan 15/3/19 5pm (sign)		Received by: AS (sign)
Date / Time:		Date / Time:	15/3/19 11:05am	Date / Time:		Date / Time: 15/3/19 19:30
Notes:		Temp. (°C) 0.8 ICE.		Notes:		Temp. (°C)
		Notes: ice present / no ice seals intact / no seal				Notes: ice present / no ice seals intact / no seal

95 Mitchell Road
Cardiff, NSW 2285

newcastle@kleinfelder.com
Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG	Metals: Additional Metals to make up NEPM 15	Metals: Iron (dissolved)	Other Analytes: General water suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
Trip Blank	9			15/3				4	X	X	X				X	
BH4	10			15/3				6	X	X	X	X	X	X	X	
~~BH~~ BH1	11			15/3				5	X	X	X	X	X	X		
BH11	12			15/3				5	X	X	X	X	X	X		
BH2	13			15/3				5	X	X	X	X	X	X		

Environmental Division
Sydney
Work Order Reference
ES1907792

Telephone : - 61-2-8784 8555

LAB OF ORIGIN:
NEWCASTLE

EMAILED

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number: #645653

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cobbage Tree Rd water monitoring	Sampler Name	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number	045 8197 676	
	Job No.:	20190803	Contact e-mail	dkousbroek@kleinfelder.com	
	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler)	Tom Overton	
	Data QA level:	LAB minimum unless specified.	PM e-mail	toverton@kleinfelder.com	

CHAIN OF CUSTODY

Relinquished by (print) / (sign)	Received by (print) / (sign)	Relinquished (sign)	Received by: (sign)	Send Results to:
Date / Time: 14/3	Date / Time: 14/03/19	Date / Time	Date / Time:	95 Mitchell Road Cardiff, NSW 2285
Notes:	Temp (°C) Notes: 5.3 1Q ice present / no ice seals intact / no seal	Notes:	Temp (°C) Notes: ice present / no ice seals intact / no seal	newcastle@kleinfelder.com Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG	Metals: Additional Metals to make up NEPM 15	Metals: Iron (dissolved)	Other Analytes: Ecofish Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
Rinsate02			Water	14/3				5	X	X	X	*			X	
SW3			Water	14/3				5	X	X	X	X	X	X		
Trip Blank			Water	14/3/3				3	X	X	X				X	
MW2395			Water	14/3				5	X	X	X	X	X	X		
BH7			Water	14/3				6	X	X	X	X	X	X	X	
BH6			Water	14/3				6	X	X	X	X	X	X	X	
BH8			Water	14/3				6	X	X	X	X	X	X	X	
Dup02			Water	14/3				5	X	X	X				X	
Trip02			Water	14/3				5	X	X	X				X	Send to Eurofins.

Subcon / Forward Lab / Split WO
Lab / Analysis: TRIBU / Eurofins
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

LAB OF ORIGIN: NEWCASTLE

Environmental Division
Sydney
Work Order Reference
ES1907792

Telephone : +61-2-8784 8555

W-05 SG - TRIBUTEXN 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Melbourne
6 Monterey Road
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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name:	Dan Kousbroek
Project name:	WSS - CABBAGE TREE RD WATER MONITORING
Project ID:	20190803
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Mar 15, 2019 3:48 PM
Eurofins | mgt reference:	**645653**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Dan Kousbroek - dkousbroek@kleinfelder.com.

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
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NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**		**Received:**	Mar 15, 2019 3:48 PM
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	645653	**Due:**	Mar 22, 2019
		Phone:	02 4949 5200	**Priority:**	5 Day
		Fax:		**Contact Name:**	Dan Kousbroek
Project Name:	WSS - CABBAGE TREE RD WATER MONITORING				
Project ID:	20190803				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TRIP02	Mar 14, 2019		Water	S19-Ma19698	X	X	X
Test Counts						1	1	1

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Dan Kousbroek**

Report **645653-W**
Project name WSS - CABBAGE TREE RD WATER MONITORING
Project ID 20190803
Received Date Mar 15, 2019

Client Sample ID			**TRIP02**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Ma19698**
Date Sampled			**Mar 14, 2019**
Test/Reference	LOR	Unit	
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	107
13C2-8:2 FTSA (surr.)	1	%	104
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
13C2-6:2 FTSA (surr.)	1	%	139
PFASs Summations			
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	< 0.02
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.001
Cobalt (filtered)	0.001	mg/L	0.002
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	1.7
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.019
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	< 0.005

Client Sample ID			TRIP02
Sample Matrix			Water
Eurofins | mgt Sample No.			S19-Ma19698
Date Sampled			Mar 14, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	112
13C5-PFPeA (surr.)	1	%	141
13C5-PFHxA (surr.)	1	%	136
13C4-PFHpA (surr.)	1	%	115
13C8-PFOA (surr.)	1	%	119
13C5-PFNA (surr.)	1	%	96
13C6-PFDA (surr.)	1	%	132
13C2-PFUnDA (surr.)	1	%	102
13C2-PFDoDA (surr.)	1	%	134
13C2-PFTeDA (surr.)	1	%	188
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	106
D3-N-MeFOSA (surr.)	1	%	84
D5-N-EtFOSA (surr.)	1	%	90
D7-N-MeFOSE (surr.)	1	%	96
D9-N-EtFOSE (surr.)	1	%	128
D5-N-EtFOSAA (surr.)	1	%	56
D3-N-MeFOSAA (surr.)	1	%	78
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	156

Client Sample ID			TRIP02
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Ma19698**
Date Sampled			**Mar 14, 2019**
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFSAs)			
18O2-PFHxS (surr.)	1	%	122
13C8-PFOS (surr.)	1	%	116

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Mar 21, 2019	14 Day
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
NEPM 1999 Metals : Metals M15 (Filtered)			
Heavy Metals (filtered)	Sydney	Mar 19, 2019	180 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Mar 19, 2019	28 Day
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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Brisbane
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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**	
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	645653
		Phone:	02 4949 5200
		Fax:	
Project Name:	WSS - CABBAGE TREE RD WATER MONITORING		
Project ID:	20190803		

Received:	Mar 15, 2019 3:48 PM	
Due:	Mar 22, 2019	
Priority:	5 Day	
Contact Name:	Dan Kousbroek	

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	NEPM 1999 Metals : Metals M15	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	
Brisbane Laboratory - NATA Site # 20794								X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TRIP02	Mar 14, 2019		Water	S19-Ma19698	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	78			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	87			50-150	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	96			70-130	Pass	
Barium (filtered)	%	93			70-130	Pass	
Beryllium (filtered)	%	81			70-130	Pass	
Boron (filtered)	%	89			70-130	Pass	
Cadmium (filtered)	%	94			70-130	Pass	
Chromium (filtered)	%	93			70-130	Pass	
Cobalt (filtered)	%	93			70-130	Pass	
Copper (filtered)	%	91			70-130	Pass	
Iron (filtered)	%	91			70-130	Pass	
Lead (filtered)	%	91			70-130	Pass	
Manganese (filtered)	%	90			70-130	Pass	
Mercury (filtered)	%	93			70-130	Pass	
Nickel (filtered)	%	90			70-130	Pass	
Vanadium (filtered)	%	95			70-130	Pass	
Zinc (filtered)	%	83			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	84			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	76			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	68			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	89			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	68			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	70			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	69			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	77			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	53			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	60			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	52			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	86			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	67			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	50			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	74			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	67			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	68			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	57			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)			%	59			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	84			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	65			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	73			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	74			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Ma26190	NCP	%	71			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Ma26190	NCP	%	104			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Ma26190	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Ma26190	NCP	%	84			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Ma22192	NCP	%	103			70-130	Pass	
Barium (filtered)	S19-Ma22192	NCP	%	100			70-130	Pass	
Beryllium (filtered)	S19-Ma22192	NCP	%	85			70-130	Pass	
Boron (filtered)	S19-Ma22192	NCP	%	93			70-130	Pass	
Cadmium (filtered)	S19-Ma22192	NCP	%	96			70-130	Pass	
Chromium (filtered)	S19-Ma22192	NCP	%	94			70-130	Pass	
Cobalt (filtered)	S19-Ma22192	NCP	%	94			70-130	Pass	
Copper (filtered)	S19-Ma22192	NCP	%	92			70-130	Pass	
Iron (filtered)	S19-Ma22192	NCP	%	87			70-130	Pass	
Lead (filtered)	S19-Ma22192	NCP	%	91			70-130	Pass	
Manganese (filtered)	S19-Ma22192	NCP	%	92			70-130	Pass	
Mercury (filtered)	S19-Ma22192	NCP	%	88			70-130	Pass	
Nickel (filtered)	S19-Ma22192	NCP	%	89			70-130	Pass	
Vanadium (filtered)	S19-Ma22192	NCP	%	97			70-130	Pass	
Zinc (filtered)	S19-Ma22192	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S19-Ma26190	NCP	%	82			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S19-Ma26190	NCP	%	90			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S19-Ma26190	NCP	%	76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S19-Ma26190	NCP	%	76			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S19-Ma26190	NCP	%	68			50-150	Pass	
Perfluorononanoic acid (PFNA)	S19-Ma26190	NCP	%	83			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S19-Ma26190	NCP	%	70			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S19-Ma26190	NCP	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S19-Ma26190	NCP	%	68			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S19-Ma26190	NCP	%	73			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S19-Ma26190	NCP	%	72			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S19-Ma26190	NCP	%	61			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Ma26190	NCP	%	58			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Ma26190	NCP	%	52			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Ma26190	NCP	%	111			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Ma26190	NCP	%	60			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Ma26190	NCP	%	56			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Ma26190	NCP	%	74			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S19-Ma26190	NCP	%	64			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S19-Ma26190	NCP	%	92			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S19-Ma26190	NCP	%	58			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S19-Ma26190	NCP	%	53			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S19-Ma26190	NCP	%	71			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S19-Ma26190	NCP	%	54			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S19-Ma26190	NCP	%	67			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S19-Ma26190	NCP	%	63			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	S19-Ma19698	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	S19-Ma19698	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-Ma19698	CP	mg/L	0.001	0.001	3.0	30%	Pass	
Cobalt (filtered)	S19-Ma19698	CP	mg/L	0.002	0.002	4.0	30%	Pass	
Copper (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S19-Ma19698	CP	mg/L	1.7	1.7	<1	30%	Pass	
Lead (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S19-Ma19698	CP	mg/L	0.019	0.018	5.0	30%	Pass	
Nickel (filtered)	S19-Ma19698	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Vanadium (filtered)	S19-Ma19698	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S19-Ma19698	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Ma26189	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S19-Ma26189	NCP	ug/L	0.04	0.04	10	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S19-Ma26189	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

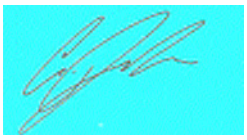
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Jonathon Angell	Senior Analyst-Organic (QLD)



Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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APPENDIX B3: APRIL 2019

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NEWCASTLE OFFICE

31 May 2019
Document Ref: NCA19R96067

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Water quality monitoring results at Cabbage Tree Road Sand Quarry – April 2019 monitoring

Please find enclosed the Water quality monitoring results at Cabbage Tree Road Sand Quarry for the April 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The April monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 24 April 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The April 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of initial Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	2	1
Metals***	11	1	1	2	1
Iron (dissolved)	11	1	1	2	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	2	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.277	2.495	8.12	Well in good condition, will require well end cap. Slightly cloudy, no apparent odour
BH2	7.79	5.833	1.957	9.02	Dark brown to black, no odour
BH3	7.57	6.059	1.511	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.878	1.182	5.92	Cloudy, no odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH5	7.36	5.914	1.446	8.71	Slight sulfur odour – No sample taken.
BH6	3.62	1.761	1.859	4.52	Cloudy with slight sulfur odour.
BH7	2.98	1.744	1.236	4.51	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.511	1.369	6.18	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.254	3.376	5.29	Cloudy, slight sulfur smell
BH12	8.67	6.846	1.824	8.12	40mm inner tube installed. No odour – No sample taken
MW239S	3.04	1.421	1.619	3.89	Light Brown - Slight Sulfur odour
MW239D	3.04	1.392	1.648	20.2	No odour – No sample taken
SW01*	2.5	2.49	0.01	N/A	Small pool of surface water with stained brown water.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	1.1	0.1	N/A	Water clear, no odour.
SW04*	2	1.9	1.9	N/A	Water clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1315	21.41	87	5.48	91.9
BH02	1245	22.9	87	4.59	308
BH04	1210	21.43	43	4.88	269.9
BH06	1510	22.03	144	4.52	140.1
BH07	1530	22.9	233	4.45	94.3
BH08	1600	20.66	300	4.53	17.6
BH11	1345	21.64	155	4.75	78.3
MW239S	1445	21.43	352	4.72	45.3
SW01	1200	23.16	1003	3.95	405.9
SW03	1430	19.88	311	6.02	-12.8
SW04	1115	17.57	339	3.69	430.5

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	0.01	11	10	94	No	Similar
	Sulphate	1	11	2.0	310	SW1 outside NHMRC ADWG 6 aesthetic criteria	Similar
	Chloride	1	11	19	97	No	Similar
	Fluoride	0.1	11	<0.1	0.5	No	Similar
	Reactive Phosphorous	0.01	0	-	-	-	N/A
	Total Phosphorous	0.01	0	-	-	-	N/A
	Nitrite	0.01	0	-	-	-	N/A
	Nitrate	0.01	0	-	-	-	N/A
	Ammonia	0.01	0	-	-	-	N/A
	Total Nitrogen	0.1	0	-	-	-	N/A
	Total Hardness	1	11	9.0	299	SW1 outside NHMRC ADWG 6 aesthetic criteria	Similar
	Total Dissolved Solids	1	11	35	580	No	Similar
	pH	0.01	11	4.0	5.83	All outside All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	11	<0.001	0.001	No	Similar
	B	0.005-0.1	11	<0.05	0.014	No	Similar
	Ba	0.005-0.1	11	0.003	0.059	No	Similar
	Be	0.005-0.1	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	11	<0.001	0.004	5 above ANZECC 2000 Trigger Values[2]	Similar
	Co	0.005-0.1	11	<0.001	0.017	No	Similar
	Cu	0.005-0.1	11	<0.001	0.003	5 above ANZECC 2000 Trigger Values[2]	Similar – note that SW1 and SW4 had not previously been sampled due to insufficient water
	Fe	0.005-0.1	11	0.06	13	10 above NHMRC ADWG 6 aesthetic criteria	Similar – note that SW1 had not previously been sampled due to insufficient water
	Mn	0.005-0.1	11	0.003	0.841	1 above NHMRC ADWG 6 aesthetic criteria	Similar – note that SW1 had not previously been sampled due to insufficient water
	Ni	0.005-0.1	11	<0.001	0.07	1 above ANZECC 2000 Trigger Values[2], and 2 above NHMRC ADWG 6	Similar
	Pb	0.005-0.1	11	<0.001	0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	0.007	0.363	7 above ANZECC 2000 Trigger Values[2]	Similar – note that SW1 and SW4 had not previously been sampled due to insufficient water
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	0.03	No	Similar – Noting that BH1 results indicate a significant reduction in C_6-C_{10} compared to previous sample round
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	$>C_{16}$-C_{34}	0.1	11	<0.1	0.28	No	Marginal increase in results at BH4 compared to previous non-detect results
	$>C_{34}$-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total $>C_{10}$-C_{40}	0.1	11	<0.1	0.28	No	Marginal increase in results compared to previous non-detect results
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	0.03	No	Similar – Noting that BH1 results indicate a significant reduction in C_6-C_{10} minus BTEX (F1) compared to previous sample round
	$>C_{10}$-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
TPH – Silica Clean up	C_{10}-C_{14}	0.05	11	<0.05	<0.05	No	Similar
	C_{15}-C_{28}	0.1	11	<0.1	0.25	No	Marginal increase in results at BH4 compared to previous non-detect results
	C_{29}-C_{36}	0.05	11	<0.05	<0.05	No	Similar
	C_{10}-C_{36}	0.05	11	<0.05	0.25	No	Marginal increase in results at BH4 compared to previous non-detect results
BTEXN	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in April than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0								
2nd	0	12.8	0	23.8								
3rd	0	0.4		0.6								
4th	0	0	0	0								
5th	0	0	0	0								
6th	0	0	0	0								
7th	5.0	0	8.2	0								
8th	0	0	0	0								
9th	0	6.6	0	0								
10th	0.2	0	12.0	2.2								
11th	0	0	0	0								
12th	3.0	0	0	0								
13th	0	0	0	0								
14th	0	0	0	0.2								
15th	0	0	0	1.4								
16th	0	0	4.8	3.6								
17th	0	0	59.4	1.4								
18th	0	0	2.6	0.2								
19th	0	0	2.2	0.2								
20th	2.4		0	2.0								
21st	1.0	1.4	0	0.2								
22nd	0	1.0	1.2	0.2								
23rd	0	1.4	0	0								
24th	0	9.2	5.4	0								
25th	0	0	5.2	0								
26th	0	0	0	0								
27th	0	0	0	0								
28th	1.0	0	0	0								
29th	0		0	0								
30th	0		38.2	0								
31st	0		6.6									
Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**								
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.9**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data and below average rainfall for April it is expected that the current groundwater and surface water levels would still be low.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
dkousbroek@kleinfelder.com

Mobile: 045 819 7676

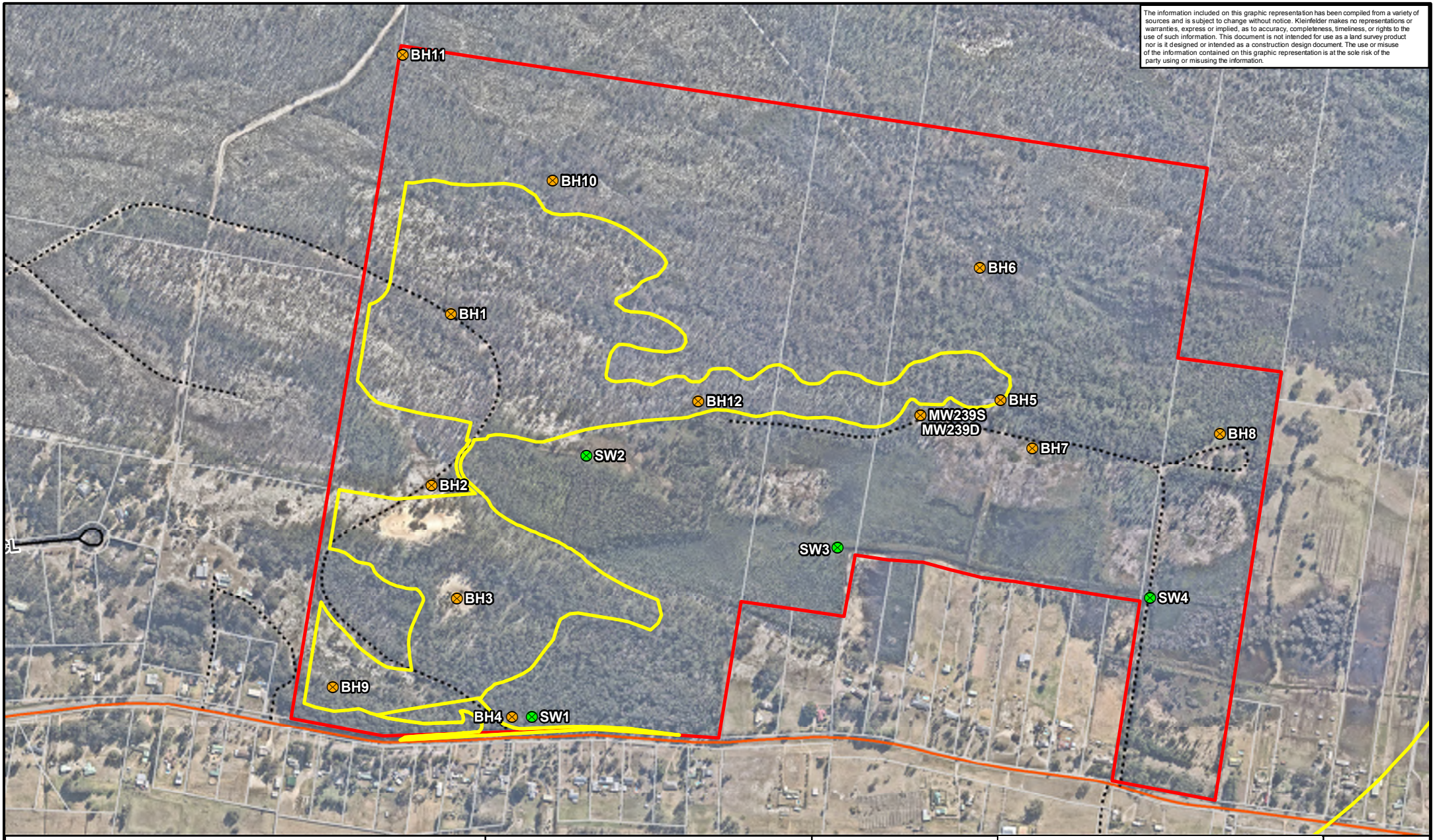
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations February 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 50	< 100	< 50	< 50	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 50	< 100	< 50	< 50	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 50	< 100	< 50	< 50	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 50	< 100	< 50	< 50	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6											0.56																		0.07		
HEPA NEMP 2018***						0.00023					19																				
HEPA NEMP 2018*											5.6																		0.7		
Sample Name	Sample Date																														
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
* Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations															Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N					Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*			0.7**	0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1912421**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 2019003	Date Samples Received	: 23-Apr-2019 16:59
Order number	:	Date Analysis Commenced	: 26-Apr-2019
C-O-C number	: ----	Issue Date	: 01-May-2019 16:39
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- TDS by method EA-015 may bias high FOR VARIOUS SAMPLES due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EN055: Ionic Balance out of acceptable limits for sample 1 and 8 due to analytes not quantified in this report.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW4	SW1	BH4	BH2	BH1
			Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit	ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.00	4.01	5.05	4.82	5.83
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	293	893	54	70	84
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	198	707	61	84	97
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	190	580	35	46	55
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	32	147	575	248
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	33	299	9	13	11
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	10
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	10
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	310	3	6	4
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	64	95	19	23	25
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	5	34	2	2	1
Magnesium	7439-95-4	1	mg/L	5	52	1	2	2
Sodium	7440-23-5	1	mg/L	39	94	10	14	14
Potassium	7440-09-7	1	mg/L	<1	6	1	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	0.14	0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.059	0.043	0.013	0.005	0.003
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	0.003	0.017	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.004

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.003**	**0.002**	**0.002**	**0.004**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.037**	**0.841**	**0.045**	**0.018**	**0.015**
Nickel	7440-02-0	0.001	mg/L		**0.005**	**0.020**	**0.007**	**0.001**	**0.002**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.030**	**0.356**	**0.008**	**0.008**	**0.363**
Iron	7439-89-6	0.05	mg/L		**2.09**	**4.16**	**0.99**	**0.19**	**10.1**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	**0.5**	<0.1	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**3.05**	**9.13**	**0.60**	**0.77**	**0.99**
Total Cations	----	0.01	meq/L		**2.36**	**10.2**	**0.64**	**0.87**	**0.82**
Ionic Balance	----	0.01	%		**12.9**	**5.60**	**----**	**----**	**----**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	**250**	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	**250**	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	**280**	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	**280**	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**40**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**30**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	**30**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**99.7**	**104**	**102**	**106**
Toluene-D8	2037-26-5	2	%		**114**	**116**	**112**	**115**	**112**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	SW1	BH4	BH2	BH1
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-001	ES1912421-002	ES1912421-003	ES1912421-004	ES1912421-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		122	117	119	115	116
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	102	----	----
13C8-PFOA	----	0.02	%		----	----	83.9	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH11	SW3	MW239S	BH6	BH7
			Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit	ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.99	5.20	4.92	4.64	4.51
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	150	220	294	136	205
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	135	190	208	115	185
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	98	143	191	88	133
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	112	9	385	62	20
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	20	45	29	24	25
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	42	9	18	17
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	57	53	97	42	62
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	8	<1	3	<1
Magnesium	7439-95-4	1	mg/L	5	6	7	4	6
Sodium	7440-23-5	1	mg/L	32	37	64	25	38
Potassium	7440-09-7	1	mg/L	<1	1	1	1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.006	0.043	0.008	0.030	0.012
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	0.003	<0.001	<0.001	0.003
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	0.002	<0.001	0.002

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	**0.001**	<0.001	**0.001**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.007**	**0.046**	**0.004**	**0.010**	**0.026**
Nickel	7440-02-0	0.001	mg/L		**0.070**	**0.004**	**0.004**	<0.001	**0.004**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.040**	**0.016**	**0.007**	**0.022**	**0.010**
Iron	7439-89-6	0.05	mg/L		**0.98**	**2.01**	**1.01**	**0.96**	**2.00**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**1.65**	**2.37**	**2.92**	**1.56**	**2.10**
Total Cations	----	0.01	meq/L		**1.80**	**2.53**	**3.38**	**1.59**	**2.20**
Ionic Balance	----	0.01	%		**----**	**----**	**7.32**	**----**	**----**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	----	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	----	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	----	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	----	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	----	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	----	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	----	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	**107**	**100**	**109**	**111**
Toluene-D8	2037-26-5	2	%		**115**	**111**	**113**	**112**	**113**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	SW3	MW239S	BH6	BH7
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00
Compound	CAS Number	LOR	Unit		ES1912421-006	ES1912421-007	ES1912421-008	ES1912421-009	ES1912421-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		115	118	112	120	120
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	----	105	110
13C8-PFOA	----	0.02	%		----	----	----	80.4	76.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
			Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1912421-011	ES1912421-012	ES1912421-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.76**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**264**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**223**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**172**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**121**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**29**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**8**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**89**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**7**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**53**	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.001**	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	**0.008**	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.001**	<0.001	<0.001	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.009**	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.008**	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**3.20**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**2.68**	----	----	----	----
Total Cations	----	0.01	meq/L		**2.88**	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	**108**	**106**	----	----
Toluene-D8	2037-26-5	2	%		**115**	**111**	**111**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	RINSATE 03	TRIP BLANK 03	----	----
				Client sampling date / time	23-Apr-2019 00:00	23-Apr-2019 00:00	23-Apr-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1912421-011	ES1912421-012	ES1912421-013	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**112**	**116**	**115**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**106**	**104**	**----**	**----**
13C8-PFOA	----	0.02	%		**84.8**	**91.7**	**89.3**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1912421**	Page	: 1 of 13
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 2019003	Date Samples Received	: 23-Apr-2019
Order number	:	Date Analysis Commenced	: 26-Apr-2019
C-O-C number	: ----	Issue Date	: 01-May-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2316377)									
ES1912421-001	SW4	EA005-P: pH Value	----	0.01	pH Unit	4.00	3.90	2.53	0% - 20%
ES1912421-010	BH7	EA005-P: pH Value	----	0.01	pH Unit	4.51	4.49	0.444	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2316380)									
ES1912421-001	SW4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	293	289	1.26	0% - 20%
ES1912421-010	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	205	206	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2314835)									
ES1911927-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	169	155	8.63	0% - 50%
ES1912421-002	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	707	702	0.638	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2314834)									
ES1911927-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1912421-002	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	32	34	8.36	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2316379)									
ES1912421-001	SW4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ES1912421-010	BH7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2316032)									
ES1912421-001	SW4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	60	57	6.32	0% - 20%
ES1912421-010	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	6.46	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2316033)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 2316033) - continued									
ES1912421-001	SW4	ED045G: Chloride	16887-00-6	1	mg/L	64	59	7.71	0% - 20%
ES1912421-010	BH7	ED045G: Chloride	16887-00-6	1	mg/L	62	62	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2315894)									
ES1912421-001	SW4	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	39	39	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1912494-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	1	1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	319	319	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2315892)									
ES1912421-001	SW4	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.059	0.059	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.037	0.038	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.030	0.027	10.5	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.09	2.12	1.70	0% - 20%
ES1912494-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.007	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.032	0.031	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2315892) - continued									
ES1912494-001	Anonymous	EG020A-F: Boron	7440-42-8	0.05	mg/L	0.09	0.09	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2317350)									
ES1912361-011	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.074	0.076	1.98	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	3.66	3.66	0.0574	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.05	1.05	0.00	0% - 20%
ES1912586-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.019	0.020	6.19	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.15	0.16	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2315893)									
ES1912421-002	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1912421-009	BH6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2317347)									
ES1912345-008	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1912345-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK040P: Fluoride by PC Titrator (QC Lot: 2316378)									
ES1912421-001	SW4	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
ES1912421-010	BH7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1912421-010	BH7	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1912421-010	BH7	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2318345)									
ES1912421-001	SW4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1912421-010	BH7	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	150	156	4.38	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.56	1.64	5.12	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.88	0.89	0.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	5.65	5.77	2.07	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	4.04	4.16	2.95	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.31	0.34	9.44	0% - 50%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2318601) - continued									
ES1912421-012	RINSATE 03	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.95	0.95	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.93	0.91	2.50	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	3.56	3.46	2.80	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.42	0.43	2.58	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.54	0.50	8.03	0% - 20%
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.90	0.86	4.68	0% - 20%
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	0.10	0.11	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.7	0.8	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.68	0.64	6.68	0% - 20%
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2318601) - continued									
ES1912561-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1912561-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	5.00	4.98	0.441	0% - 20%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2318601)									
ES1912421-012	RINSATE 03	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1912561-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	176	182	3.47	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2316377)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.2	98	102
				----	7 pH Unit	99.3	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2316380)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	98.4	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2314835)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.3	87	109
				<10	293 mg/L	110	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2314834)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	90.7	83	129
				<5	1000 mg/L	99.4	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2316379)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	84.9	81	111
				----	50 mg/L	89.1	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2316032)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2316033)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	81	127
				<1	1000 mg/L	102	81	127
ED093F: Dissolved Major Cations (QCLot: 2315894)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	108	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	109	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	107	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	103	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	82	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	105	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	113	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	112	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.9	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	89.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	84.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	84.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	84.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	83.1	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.3	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	85.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.9	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	85.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2315893)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.1	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2317347)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.5	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2316378)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	87.0	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2314899)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	80.0	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.3	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	103	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2314899)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	85.1	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	101	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	100	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2318345)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	83.8	75	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2318345)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	85.2	75	127
EP080: BTEXN (QCLot: 2318345)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	86.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.1	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.7	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	94.5	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.5	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	104	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2318601)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	90.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	99.0	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	99.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	96.6	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	92.6	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	105	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	97.2	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	105	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	105	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	91.6	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	93.2	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	102	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	97.4	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	105	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2318601)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	115	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	98.2	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	114	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	94.8	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2316032)							
ES1912421-001	SW4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2316033)							
ES1912421-001	SW4	ED045G: Chloride	16887-00-6	250 mg/L	99.6	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2315892)							
ES1912421-003	BH4	EG020A-F: Arsenic	7440-38-2	1 mg/L	103	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	105	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	103	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	98.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	102	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	101	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	106	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350)							
ES1912361-012	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	128	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	130	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	86.7	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	89.3	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2317350) - continued							
ES1912361-012	Anonymous	EG020A-F: Chromium	7440-47-3	1 mg/L	95.2	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	130	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	130	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	110	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.1	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	130	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	91.3	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2315893)							
ES1911757-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	94.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2317347)							
ES1911923-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	84.5	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2316378)							
ES1912421-001	SW4	EK040P: Fluoride	16984-48-8	5 mg/L	80.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2318345)							
ES1912421-001	SW4	EP080: C6 - C9 Fraction	----	325 µg/L	87.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2318345)							
ES1912421-001	SW4	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	85.7	70	130
EP080: BTEXN (QCLot: 2318345)							
ES1912421-001	SW4	EP080: Benzene	71-43-2	25 µg/L	85.4	70	130
		EP080: Toluene	108-88-3	25 µg/L	93.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	96.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.6	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	99.9	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.9	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	94.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	114	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	109	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	97.2	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	94.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	103	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	111	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2318601) - continued							
ES1912421-012	RINSATE 03	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	118	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	110	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	106	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	110	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	105	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	105	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	103	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	91.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	104	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	78.3	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	105	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	101	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	114	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	107	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2318601)							
ES1912421-012	RINSATE 03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	101	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	102	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	113	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1912421**	Page	: 1 of 11
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Telephone	: +6138549 9630
Project	: 2019003	Date Samples Received	: 23-Apr-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 01-May-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1912421--001	SW4	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
SW4,	SW1,	----	----	----	26-Apr-2019	23-Apr-2019	**3**
BH4,	BH2,						
BH1,	BH11,						
SW3,	MW239S,						
BH6,	BH7,						
BH8							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	23-Apr-2019	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	30-Apr-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	30-Apr-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	07-May-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	20-Oct-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**----**	----	----	**29-Apr-2019**	20-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**29-Apr-2019**	21-May-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**----**	----	----	**30-Apr-2019**	21-May-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8	**23-Apr-2019**	**----**	----	----	**26-Apr-2019**	21-May-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	30-Apr-2019	✓	**01-May-2019**	08-Jun-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	30-Apr-2019	✓	**01-May-2019**	08-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**30-Apr-2019**	07-May-2019	✓	**30-Apr-2019**	07-May-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**30-Apr-2019**	07-May-2019	✓	**30-Apr-2019**	07-May-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW4, SW1, BH4, BH2, BH1, BH11, SW3, MW239S, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**30-Apr-2019**	07-May-2019	✓	**30-Apr-2019**	07-May-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	20-Oct-2019	✓	**30-Apr-2019**	20-Oct-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	20-Oct-2019	✓	**30-Apr-2019**	20-Oct-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	20-Oct-2019	✓	**30-Apr-2019**	20-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	20-Oct-2019	✓	**30-Apr-2019**	20-Oct-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE 03, TRIP BLANK 03	**23-Apr-2019**	**29-Apr-2019**	20-Oct-2019	✓	**30-Apr-2019**	20-Oct-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	36	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1912421**

Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: TOM OVERTON	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: toverton@kleinfelder.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 2019003	Page	: 1 of 3
Order number	:	Quote number	: EM2019ALLENVENG0010 (ME/114/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Sampler	: DANIEL KOUSBROEK		

Dates

Date Samples Received	: 23-Apr-2019 16:59	Issue Date	: 25-Apr-2019
Client Requested Due Date	: 01-May-2019	Scheduled Reporting Date	: **01-May-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 0.6'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 13 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA recommends samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-12 General Water Suite	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1912421-001	23-Apr-2019 00:00	SW4	✓	✓	✓		✓	✓	✓
ES1912421-002	23-Apr-2019 00:00	SW1	✓	✓	✓		✓	✓	✓
ES1912421-003	23-Apr-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1912421-004	23-Apr-2019 00:00	BH2	✓	✓	✓		✓	✓	✓
ES1912421-005	23-Apr-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1912421-006	23-Apr-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1912421-007	23-Apr-2019 00:00	SW3	✓	✓	✓		✓	✓	✓
ES1912421-008	23-Apr-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1912421-009	23-Apr-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1912421-010	23-Apr-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1912421-011	23-Apr-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1912421-012	23-Apr-2019 00:00	RINSATE 03			✓	✓		✓	✓
ES1912421-013	23-Apr-2019 00:00	TRIP BLANK 03			✓	✓		✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **WATER** Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received Date	Samples Received Evaluation	Instructions Received Date	Instructions Received Evaluation
EA005-P: pH by PC Titrator							
BH11	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH1	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH2	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH4	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH6	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH7	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
BH8	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
MW239S	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
SW1	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
SW3	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×
SW4	Clear Plastic Bottle - Natural	----	23-Apr-2019	23-Apr-2019	✓	24-Apr-2019	×

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

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Client:	SITE, COC AND CONTACT DATA			
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek
	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676
	Job No.:	20190903	Contact e-mail:	dkousbroek@kleinfelder.com
	Required TAT:	24 hrs 48 hrs 3 days **5 days** 7 days	PM name (if not sampler):	Tom Overton
	Data QA level:	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com

6.6°C
14

Laboratory:
ALS
5/585 Maitland Rd
Mayfield West,
Newcastle NSW 2304
Phone: (02) 4014 2500

CHAIN OF CUSTODY

Relinquished by (print):	Cheyne Ooi	Received by (print):		Relinquished:		Received by:	AS
(sign)		(sign)		(sign)		(sign)	
Date / Time:	23/4 1655	Date / Time:	23/4/19	Date / Time:	24/4/19 17:00	Date / Time:	24/4/19 19:30
Notes:		Temp. (°C)		Notes:		Temp. (°C)	
		Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal

Send Results to:

95 Mitchell Road
Cardiff, NSW 2285

newcastle@kleinfelder.com
Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG	Metals: Additional Metals to make up NEPM 15	Metals: Boron (dissolved)	Other Analytes: General Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)	Comments
SW4	1		Water	23.4				5	X	X	X	X	X	X		
SW1	2		water	23.4				5	X	X	X	X	X	X		
BH4	3							6	X	X	X	X	X	X	X	
BH2	4							5	X	X	X	X	X	X		
BH1	5							5	X	X	X	X	X	X		
BH11	6							5	X	X	X	X	X	X		LAB OF ORIGIN: NEWCASTLE
SW3	7							5	X	X	X	X	X	X		
MW23S	8							5	X	X	X	X	X	X		
BH6	9							6	X	X	X	X	X	X	X	
BH7	10							6	X	X	X	X	X	X	X	
BH8	11							6	X	X	X	X	X	X	X	
Rinsate 03	12							5	X	X	X				X	
Trip Blank 03	13							5	X	X	X				X	

Environmental Division
Sydney
Work Order Reference
ES1912421

W-05 SG - TRH/BTEXN/ 6 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Co
Boron (B), Barium (Ba), Beryllium (Be), Cobalt (C

Telephone : +61-2-8784 8555

APPENDIX B4: MAY 2019

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www.kleinfelder.com.au
ABN: 23 146 082 500
NEWCASTLE OFFICE

31 May 2019
Document Ref: NCA19R96068

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry – May 2019 monitoring

Please find enclosed the Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry for the May 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work included the monthly surface and groundwater monitoring and also included additional monitoring as part of the quarterly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The May monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled), including additional analytical parameters and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 16 May 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The May 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Extended Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	7	1	1	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.319	2.321	8.12	Very light brown, no odour.
BH2	7.79	5.86	1.93	9.02	Dark brown, no odour
BH3	7.57	6.064	1.506	9.03	Data logger downloaded.
BH4	3.06	1.847	1.213	5.92	Stained brown, no odour.
BH5	7.36	5.894	1.466	8.71	No sample taken. Data logger downloaded.
BH6	3.62	1.766	1.854	4.52	Light brown, no odour.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH7	2.98	1.744	1.236	4.51	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.511	1.369	6.18	Sulfur smell - cloudy
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.311	3.319	5.29	Data logger downloaded. Light brown, no odour.
BH12	8.67	6.863	1.807	8.12	Acrylic odour. No sample taken.
MW239S	3.04	1.412	1.628	3.89	Data logger downloaded. Dark brown, sulfur odour.
MW239D	3.04	1.383	1.657	20.2	No odour – No sample taken
SW01*	2.5	0.01	2.51	N/A	Small pool of surface water with stained brown water.
SW02*	3.3	Dry	-	N/A	Location was dry.
SW03*	2.1	0.1	1.1	N/A	Water clear, no odour.
SW04*	2	0.135	2.135	N/A	Water clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1220	20.57	150	5.42	25.6
BH02	1200	21.13	124	4.56	111
BH04	1145	20.14	110	4.65	98.5
BH06	1415	20.62	226	4.7	-5.2
BH07	1445	20.62	226	4.7	-5.2
BH08	1500	20.86	298	4.74	-75
BH11	1245	19.94	232	4.68	-71.5
MW239S	1345	19.49	392	4.64	-65.8
SW01	1115	14.9	966	4.42	106.7
SW03	1315	14.54	344	5.54	71.6
SW04	1030	12.03	389	3.69	211.4

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	0.01	11	9	86	No	Similar
	Sulphate	1	11	2.0	324	1 outside NHMRC ADWG 6 aesthetics	Similar
	Chloride	1	11	19	112	No	Similar
	Fluoride	0.1	11	<0.1	0.3	No	Similar
	Reactive Phosphorous	0.01	11	< 0.01	0.03	1 outside ANZECC 2000 Trigger range[1]	No comparison data for the extended water suite at BH1. Similar to start up sampling event 22/02/19 with the extended water suite
	Total Phosphorous	0.01	11	< 0.01	0.97	6 outside ANZECC 2000 Trigger range[1]	Similar to start up sampling event 22/02/19 with the extended water suite
	Nitrite	0.01	11	< 0.01	< 0.01	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Nitrate	0.01	11	< 0.01	0.38	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Ammonia	0.01	11	< 0.01	0.27	No	Similar to start up sampling event 22/02/19 with the extended water suite
	Total Nitrogen	0.1	11	0.1	1.8	8 outside ANZECC 2000 Trigger range[1]	Similar to start up sampling event 22/02/19 with the extended water suite
	Total Hardness	1	11	8.0	233	1 outside NHMRC ADWG 6 aesthetics	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Total Dissolved Solids	1	11	47	616	1 outside NHMRC ADWG 6 aesthetics	Similar
	pH	0.01	11	4.08	5.82	All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.005-0.1	11	<0.001	0.003	No	Similar
	B	0.005-0.1	11	<0.05	0.1	No	Similar
	Ba	0.005-0.1	11	0.002	0.047	No	Similar
	Be	0.005-0.1	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values[2]	Similar
	Co	0.005-0.1	11	<0.001	0.017	No	Similar
	Cu	0.005-0.1	11	<0.001	0.003	1 above ANZECC 2000 Trigger Values[2]	Similar
	Fe	0.005-0.1	11	0.06	8.33	9 above NHMRC ADWG 6 aesthetics	Similar
	Mn	0.005-0.1	11	0.006	0.666	1 above NHMRC ADWG 6 aesthetics	Similar
	Ni	0.005-0.1	11	<0.001	0.053	1 above ANZECC 2000 Trigger Values[2], and 1 above NHMRC ADWG 6 aesthetics	Similar
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Zn	0.005-0.1	11	<0.005	0.132	7 above ANZECC 2000 Trigger Values[2]	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar – Noting that BH1 has now stabilised to below the Limit of reporting
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar – Noting that BH1 has now stabilised to below the Limit of reporting
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
TPH – Silica Clean up	C_{10}-C_{14}	0.05	11	<0.05	<0.05	No	Similar
	C_{15}-C_{28}	0.1	11	<0.1	0.25	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
	C_{29}-C_{36}	0.05	11	<0.05	<0.05	No	Similar
	C_{10}-C_{36}	0.05	11	<0.05	0.25	No	Similar – Noting that BH4 has now stabilised to below the limit of reporting
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in May than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0							
2nd	0	12.8	0	23.8	0							
3rd	0	0.4		0.6	0							
4th	0	0	0	0	20.8							
5th	0	0	0	0	0.2							
6th	0	0	0	0	23.2							
7th	5.0	0	8.2	0	0.2							
8th	0	0	0	0	0							
9th	0	6.6	0	0	0							
10th	0.2	0	12.0	2.2	0							
11th	0	0	0	0	0.6							
12th	3.0	0	0	0	0							
13th	0	0	0	0	1.4							
14th	0	0	0	0.2	0							
15th	0	0	0	1.4	0							
16th	0	0	4.8	3.6	0							
17th	0	0	59.4	1.4	0							
18th	0	0	2.6	0.2	0							
19th	0	0	2.2	0.2	0							
20th	2.4		0	2.0	0							
21st	1.0	1.4	0	0.2	0							
22nd	0	1.0	1.2	0.2	0							
23rd	0	1.4	0	0	0							
24th	0	9.2	5.4	0	0							
25th	0	0	5.2	0	0							
26th	0	0	0	0	0							
27th	0	0	0	0	0							
28th	1.0	0	0	0	0.8							
29th	0		0	0								
30th	0		38.2	0								
31st	0		6.6									
Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**							
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.9**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data and below average rainfall for May it is expected that the current groundwater and surface water levels would still be low.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

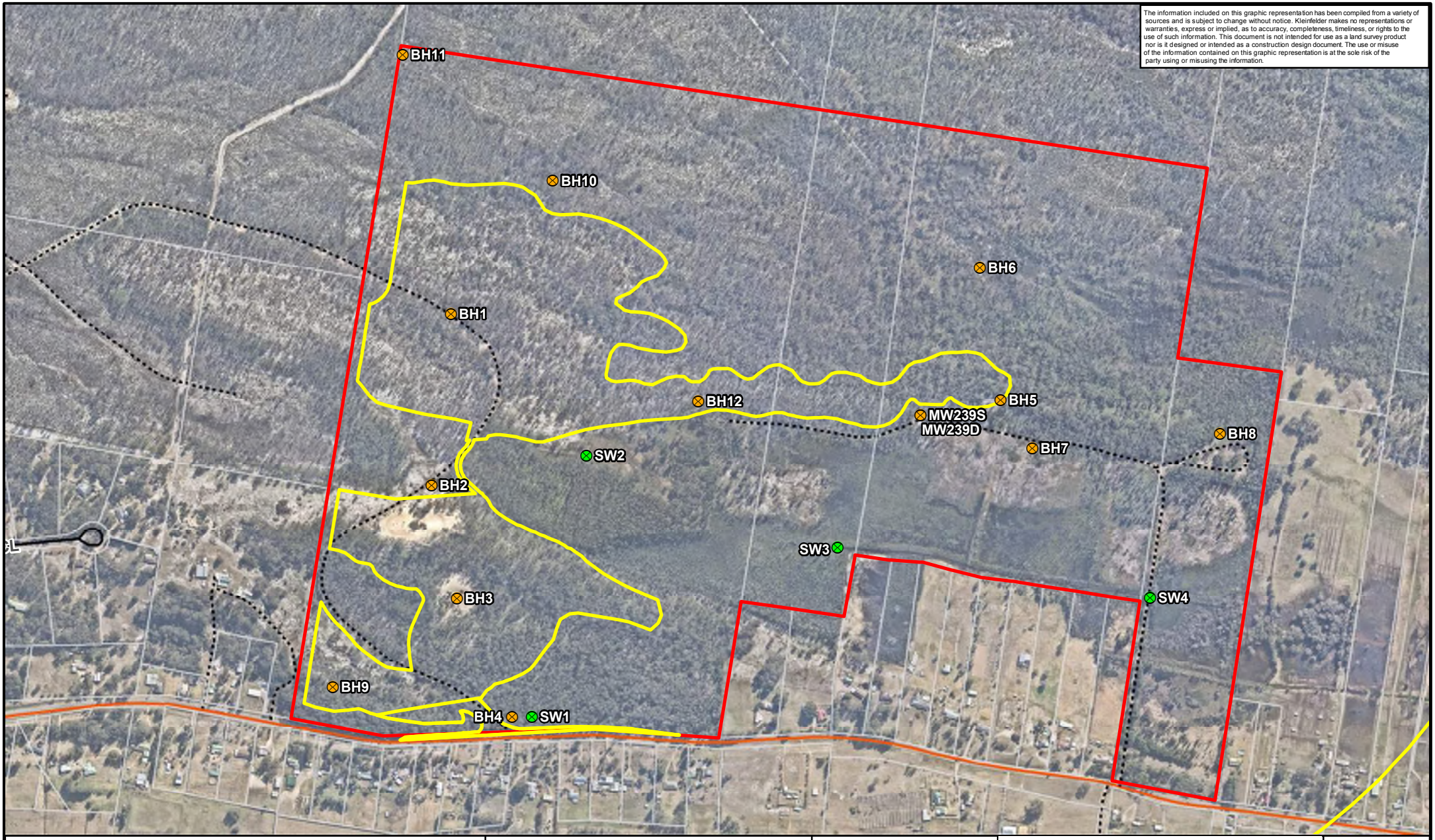
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silica Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silica Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
BH8	21-Feb-19	**0.001** *	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc

[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6											0.56																		0.07		
HEPA NEMP 2018***						0.00023					19																				
HEPA NEMP 2018[4]											5.6																		0.7		
Sample Name	Sample Date																														
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	23-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																Alkalinity						Inorganics			
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*			0.7**	0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20					< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1914860**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-May-2019 16:31
Order number	:	Date Analysis Commenced	: 17-May-2019
C-O-C number	: ----	Issue Date	: 23-May-2019 15:47
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RO WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- TDS by method EA-015 may bias high for various samples due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EK071G:It has been noted that Reactive P is greater than Total P on sample No 7, however this difference is within the limits of experimental variation.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH8	BH7	BH6	MW239S	SW3
			Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit	ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.90	4.87	4.88	4.87	5.24
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	4.86	3.26	2.04	4.44	2.47
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	302	235	175	327	271
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	354	310	214	320	300
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	196	153	114	212	176
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	312	29	106	371	14
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	16	20	24	25	38
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1	<1	<1	<1	1
Total Alkalinity as CaCO3	----	1	mg/L	1	<1	<1	<1	1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	15	18	13	34
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	81	68	45	88	54
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	3	<1	7
Magnesium	7439-95-4	1	mg/L	4	5	4	6	5
Sodium	7440-23-5	1	mg/L	47	35	23	52	35
Potassium	7440-09-7	1	mg/L	<1	2	1	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.010	0.008	0.029	0.005	0.034
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	**0.003**	<0.001	<0.001	**0.002**
Chromium	7440-47-3	0.001	mg/L		**0.001**	**0.002**	<0.001	**0.002**	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.010**	**0.035**	**0.009**	**0.003**	**0.038**
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.005**	<0.001	**0.002**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.013**	<0.005	<0.005	**0.012**
Iron	7439-89-6	0.05	mg/L		**3.00**	**2.32**	**2.57**	**0.87**	**1.78**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	**0.2**	<0.1	<0.1	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.12**	**0.27**	**0.14**	**0.09**	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.9**	**0.6**	**1.7**	**0.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**0.9**	**0.6**	**1.7**	**0.1**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.06**	**0.13**	**0.43**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.43**	**2.23**	**1.64**	**2.75**	**2.25**
ø Total Cations	----	0.01	meq/L		**2.37**	**1.98**	**1.50**	**2.76**	**2.28**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH7	BH6	MW239S	SW3
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-001	ES1914860-002	ES1914860-003	ES1914860-004	ES1914860-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**115**	**110**	**119**	**107**
Toluene-D8	2037-26-5	2	%		**95.8**	**110**	**119**	**119**	**102**
4-Bromofluorobenzene	460-00-4	2	%		**95.1**	**106**	**108**	**111**	**98.3**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.7**	**95.4**	**96.9**	----	**99.7**
13C8-PFOA	----	0.02	%		**92.3**	**94.4**	**89.4**	----	**106**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH11	BH1	BH2	BH4	SW1
			Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit	ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.91	5.82	4.85	4.99	4.60
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	3.00	1.70	1.44	1.30	2.45
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	188	105	94	73	947
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	216	164	144	100	715
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	122	68	61	47	616
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	156	80	111	44	59
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	16	8	13	9	233
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	10	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	10	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	5	21	22	324
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	55	25	22	19	112
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	2	2	24
Magnesium	7439-95-4	1	mg/L	4	2	2	1	42
Sodium	7440-23-5	1	mg/L	29	12	12	9	86
Potassium	7440-09-7	1	mg/L	<1	<1	<1	1	6
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.10
Barium	7440-39-3	0.001	mg/L	0.005	0.002	0.004	0.013	0.029
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.010**
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.003**	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	**0.003**
Manganese	7439-96-5	0.001	mg/L		**0.006**	**0.009**	**0.014**	**0.022**	**0.666**
Nickel	7440-02-0	0.001	mg/L		**0.004**	**0.002**	**0.001**	**0.022**	**0.012**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.024**	**0.132**	<0.005	**0.011**	**0.077**
Iron	7439-89-6	0.05	mg/L		**0.97**	**8.33**	**0.06**	**0.27**	**7.25**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	**0.3**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.12**	**0.11**	**0.01**	<0.01	<0.01
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	<0.01	**0.38**	**0.29**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	**0.38**	**0.29**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.4**	**0.3**	**0.9**	**0.7**	**1.8**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.4**	**0.3**	**1.3**	**1.0**	**1.8**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	<0.01	**0.26**	**0.97**	**0.13**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	**0.03**	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.59**	**1.01**	**1.06**	**0.99**	**9.90**
ø Total Cations	----	0.01	meq/L		**----**	**----**	**----**	**----**	**8.94**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
ø **Total Cations**	----	0.01	meq/L		**1.59**	**0.69**	**0.79**	**0.60**	**----**
ø **Ionic Balance**	----	0.01	%		**----**	**----**	**----**	**----**	**5.13**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		**----**	**----**	**----**	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**----**	**----**	**----**	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	----	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	----	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	----	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	----	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	----	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	----	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	----	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	----	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	----	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH11	BH1	BH2	BH4	SW1
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00
Compound	CAS Number	LOR	Unit		ES1914860-006	ES1914860-007	ES1914860-008	ES1914860-009	ES1914860-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	----	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	----	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	----	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	----	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	----	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	----	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	----	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	----	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**103**	**117**	**106**	**102**	**125**
Toluene-D8	2037-26-5	2	%		**91.6**	**115**	**100**	**99.2**	**120**
4-Bromofluorobenzene	460-00-4	2	%		**95.9**	**108**	**101**	**94.8**	**114**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	----	**97.3**	**97.0**
13C8-PFOA	----	0.02	%		----	----	----	**99.9**	**96.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
			Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1914860-011	ES1914860-012	ES1914860-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.08**	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**3.10**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**331**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**288**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**215**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**13**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**33**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**41**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**59**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**5**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**41**	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	**0.047**	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.030**	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.003**	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.019**	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**1.12**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.05**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.05**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	----	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		**0.01**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.52**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**2.44**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	--------	--------
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 04	TRIP BLANK 04	----	----
				Client sampling date / time	16-May-2019 00:00	16-May-2019 00:00	16-May-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1914860-011	ES1914860-012	ES1914860-013	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**115**	**110**	**102**	----	----
Toluene-D8	2037-26-5	2	%		**111**	**106**	**92.2**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**105**	**104**	**93.2**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**92.3**	**102**	**96.1**	----	----
13C8-PFOA	----	0.02	%		**96.0**	**96.2**	**97.2**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1914860**	Page	: 1 of 16
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-May-2019
Order number	:	Date Analysis Commenced	: 17-May-2019
C-O-C number	: ----	Issue Date	: 23-May-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RO WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
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Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2353639)									
ES1914928-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.01	7.04	0.427	0% - 20%
ES1914860-008	BH2	EA005-P: pH Value	----	0.01	pH Unit	4.85	4.75	2.08	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2353635)									
ES1914858-007	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	860	859	0.119	0% - 20%
ES1914846-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	732	733	0.139	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2353641)									
ES1914930-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10700	10600	0.387	0% - 20%
ES1914860-008	BH2	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	94	94	0.00	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2352249)									
ES1914805-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2320	2260	2.44	0% - 20%
ES1914857-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	6850	6880	0.422	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2352251)									
ES1914860-010	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	715	703	1.69	0% - 20%
ES1914930-044	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	808	826	2.26	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2352248)									
ES1914805-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	69	56	20.3	0% - 50%
ES1914857-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2352250)									
ES1914860-010	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	59	52	11.2	0% - 50%
ES1914930-044	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	111	112	0.897	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2353637)									
ES1914846-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2353637) - continued									
ES1914846-001	Anonymous	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	186	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	186	186	0.00	0% - 20%
ES1914860-008	BH2	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2352241)									
ES1914831-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2490	2340	6.12	0% - 20%
ES1914860-004	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	12	0.00	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2352244)									
ES1914860-010	SW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	324	283	13.3	0% - 20%
ES1914930-047	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	249	241	3.43	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2352242)									
ES1914831-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2750	2410	13.3	0% - 20%
ES1914860-004	MW239S	ED045G: Chloride	16887-00-6	1	mg/L	88	87	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2355265)									
ES1914860-005	SW3	ED093F: Calcium	7440-70-2	1	mg/L	7	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	35	34	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1914692-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	326	327	0.413	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2355266)									
ES1914858-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0698	0.0691	0.993	0% - 20%
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.018	0.017	0.00	0% - 50%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	0.088	0.096	8.86	0% - 20%
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.013	0.013	0.00	0% - 50%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	1.04	1.04	0.242	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.088	0.085	2.71	0% - 20%
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	5.92	6.07	2.38	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	13.2	13.3	0.579	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.02	0.03	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2355266) - continued									
ES1914858-008	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	3.92	4.07	3.62	0% - 20%
ES1914860-005	SW3	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.034	0.032	4.22	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.038	0.035	9.49	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.78	1.77	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360227)									
ES1914854-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.020	0.020	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.403	0.399	1.09	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.029	0.029	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.24	0.24	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.23	0.22	0.00	No Limit
ES1914854-019	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360227) - continued									
ES1914854-019	Anonymous	EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.008	16.4	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2360230)									
ES1914860-013	TRIP BLANK 04	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1915052-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.034	0.034	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2355267)									
ES1914858-014	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG035F: Dissolved Mercury by FIMS (QC Lot: 2355267) - continued									
ES1914860-008	BH2	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2360229)									
ES1914854-019	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2353640)									
ES1914860-008	BH2	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1914937-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2355417)									
ES1914860-007	BH1	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.11	0.11	0.00	0% - 50%
ES1914844-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.01	0.02	0.00	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2352240)									
ES1914831-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914860-004	MW239S	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2355418)									
ES1914860-003	BH6	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914844-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	6.40	6.42	0.393	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2355413)									
ES1914844-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.3	0.00	No Limit
ES1914860-008	BH2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.9	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2355414)									
ES1914854-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.15	1.04	9.37	0% - 20%
ES1914860-008	BH2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.26	0.26	0.00	0% - 20%
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2352243)									
ES1914860-010	SW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1914860-004	MW239S	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1914860-004	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1914860-004	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2354333)									
ES1914845-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2354333) - continued									
ES1914860-004	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2359754)									
ES1914860-001	BH8	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2353639)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	99.0	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2353635)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2353641)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2352249)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	102	87	109
				<10	293 mg/L	122	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2352251)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	105	87	109
				<10	293 mg/L	89.2	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2352248)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	102	83	129
				<5	1000 mg/L	101	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2352250)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	106	83	129
				<5	1000 mg/L	99.3	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2353637)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	81.0	81	111
				----	50 mg/L	84.4	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352241)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352244)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.3	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2352242)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	105	81	127
				<1	1000 mg/L	97.8	81	127
ED093F: Dissolved Major Cations (QCLot: 2355265)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.1	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.4	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.8	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.0	85	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.5	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.1	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.4	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.4	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.6	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.3	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	90.2	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360227)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.5	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.5	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.4	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	97.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.1	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	99.2	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	93.2	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.7	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.1	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.4	81	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	96.7	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	90.6	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	97.9	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.0	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.3	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	98.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2355267)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.4	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2360229)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.8	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2353640)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	89.4	82	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2355417)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	104	90	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2352240)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	104	82	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2355418)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	104	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2355413)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	89.3	69	101
				<0.1	1 mg/L	70.0	70	118
				<0.1	5 mg/L	99.2	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2355414)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.2	71	101
				<0.01	0.442 mg/L	82.4	72	108
				<0.01	1 mg/L	99.4	78	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2352243)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	90.6	85	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2352522)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	83.1	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	93.8	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	87.8	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2352522)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	92.7	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	98.2	81	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2352522) - continued								
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	95.3	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2354333)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	93.1	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2354333)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	93.7	75	127
EP080: BTEXN (QCLot: 2354333)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.7	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.7	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	92.7	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	89.7	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	94.4	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.8	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2359754)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	94.8	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	111	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	92.0	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	104	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	109	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	108	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	102	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	102	70	150

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	95.0	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	98.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2359754)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	112	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	105	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	119	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352241)							
ES1914831-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2352244)							
ES1914860-010	SW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2352242)							
ES1914831-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266)							
ES1914858-009	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	92.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	89.0	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	81.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.9	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.9	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	91.5	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	# Not Determined	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2355266) - continued							
ES1914858-009	Anonymous	EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	92.8	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360227)							
ES1914854-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	108	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	98.2	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	99.9	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	118	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	99.6	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	105	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	103	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	104	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2360230)							
ES1914993-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	107	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	100	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	104	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	102	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	104	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	107	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	121	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	107	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	107	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2355267)							
ES1914858-013	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	92.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2360229)							
ES1914854-006	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	87.3	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2353640)							
ES1914860-001	BH8	EK040P: Fluoride	16984-48-8	10 mg/L	74.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2355417)							
ES1914844-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	105	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2352240)							
ES1914831-001	Anonymous	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	103	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2355418)							
ES1914844-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	# Not Determined	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2355413)							
ES1914844-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	97.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2355414)							
ES1914854-006	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	90.0	70	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2352243)							
ES1914860-010	SW1	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	81.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	84.1	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	81.9	70	130
EP080: BTEXN (QCLot: 2354333)							
ES1914845-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	92.6	70	130
		EP080: Toluene	108-88-3	25 µg/L	92.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	90.5	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	95.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	93.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	100	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	115	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	104	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	91.4	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	99.8	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	115	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	107	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	114	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	112	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2359754) - continued							
ES1914860-001	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	113	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	109	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	114	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	123	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	111	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	102	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	104	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	98.0	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	117	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	87.5	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	115	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	94.6	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2359754)							
ES1914860-001	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	118	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	114	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	116	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1914860**	Page	: 1 of 14
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-May-2019
Site	: WSS-CABBAGE TREE RO WATER MONITORING	Issue Date	: 23-May-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1914860--010	SW1	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1914831--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	ES1914831--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	**Copper**	7440-50-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1914858--009	Anonymous	**Zinc**	7440-66-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Ar	ES1914844--001	Anonymous	**Nitrite + Nitrate as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / **Container** / Client Sample ID(s)	*Extraction / Preparation*			*Analysis*		
	Date extracted	*Due for extraction*	***Days overdue***	*Date analysed*	*Due for analysis*	***Days overdue***
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	----	----	----	17-May-2019	16-May-2019	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) - Continued					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	16-May-2019	×
EA006: Sodium Adsorption Ratio (SAR)							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	13-Jun-2019	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	13-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	23-May-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	23-May-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	13-Jun-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	30-May-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	13-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	13-Jun-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	13-Jun-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	12-Nov-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
RINSATE 04, TRIP BLANK 04	**16-May-2019**	**----**	----	----	**22-May-2019**	12-Nov-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**21-May-2019**	13-Jun-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
RINSATE 04, TRIP BLANK 04	**16-May-2019**	**----**	----	----	**22-May-2019**	13-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	13-Jun-2019	✓
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	13-Jun-2019	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**17-May-2019**	18-May-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**----**	----	----	**20-May-2019**	13-Jun-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4	**16-May-2019**	**20-May-2019**	13-Jun-2019	✓	**20-May-2019**	13-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH8, BH6, SW3, BH1, BH4, SW4, BH7, MW239S, BH11, BH2, SW1,	**16-May-2019**	**20-May-2019**	13-Jun-2019	✓	**20-May-2019**	13-Jun-2019	✓
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH8, BH6, SW3, BH1, BH4, SW4, BH7, MW239S, BH11, BH2, SW1,	**16-May-2019**	**----**	----	----	**17-May-2019**	18-May-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04, BH7, MW239S, BH11, BH2, SW1, RINSATE 04,	**16-May-2019**	**20-May-2019**	23-May-2019	✓	**22-May-2019**	29-Jun-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH8, BH6, SW3, BH1, BH4, SW4, TRIP BLANK 04, BH7, MW239S, BH11, BH2, SW1, RINSATE 04,	**16-May-2019**	**20-May-2019**	23-May-2019	✓	**22-May-2019**	29-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**20-May-2019**	30-May-2019	✓	**20-May-2019**	30-May-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**20-May-2019**	30-May-2019	✓	**20-May-2019**	30-May-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH8, BH7, BH6, MW239S, SW3, BH11, BH1, BH2, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**20-May-2019**	30-May-2019	✓	**20-May-2019**	30-May-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH8, BH7, BH6, SW3, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**21-May-2019**	12-Nov-2019	✓	**22-May-2019**	12-Nov-2019	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH8, BH7, BH6, SW3, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**21-May-2019**	12-Nov-2019	✓	**22-May-2019**	12-Nov-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH8, BH7, BH6, SW3, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**21-May-2019**	12-Nov-2019	✓	**22-May-2019**	12-Nov-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH8, BH7, BH6, SW3, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**21-May-2019**	12-Nov-2019	✓	**22-May-2019**	12-Nov-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH8, BH7, BH6, SW3, BH4, SW1, SW4, RINSATE 04, TRIP BLANK 04	**16-May-2019**	**21-May-2019**	12-Nov-2019	✓	**22-May-2019**	12-Nov-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	20	**15.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	6	53	**11.32**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	**5.66**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	**5.66**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	53	**5.66**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)

Analytical Methods	Method	Matrix	Method Descriptions
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

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Page 1 of 1

COC number:

KLEINFELDER
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Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek	ALS
95 Mitchell Road	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676	5/585 Maitland Rd
Cardiff,	Job No.:	20193820	Contact e-mail:	dkousbroek@kleinfelder.com	Mayfield West,
NSW 2285	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	Newcastle NSW 2304
Phone: 02 4949 5200	Data QA level:	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com	Phone: (02) 4014 2500

CHAIN OF CUSTODY						Send Results to:
Relinquished by (print):	Daniel Kousbroek	Received by (print):		Relinquished:	Received by:	dkousbroek@kleinfelder.com & toverton@kleinfelder.com
(sign)		(sign)		(sign)	(sign)	95 Mitchell Road
Date / Time:	16/5	Date / Time:	16/5 1943	Date / Time:	Date / Time:	Cardiff, NSW 2285
Notes:		Temp. (°C)	-0.5 ice	Notes:	Temp. (°C)	newcastle@kleinfelder.com
		Notes:	ice present / no ice seals intact / no seal		Notes:	Phone: 02 4949 5200
					ice present / no ice seals intact / no seal	

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG TRH/BTEXN	Metals: W-03 Metals - NEPM 15	Metals: Iron (dissolved)	Other Analytes: NT 14 - Extended Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: EP231X PFAS (28 analytes, standard level)	Comments
BH8	1			16/5				7	X	X	X	X	X	X	X	
BH7	2			16/5				7	X	X	X	X	X	X	X	
BH6	3			16/5				7	X	X	X	X	X	X	X	
MW239S	4			16/5				6	X	X	X	X	X	X		
SW3	5			16/5				7	X	X	X	X	X	X	X	
BH11	6			16/5				6	X	X	X	X	X	X		
BH1	7			16/5				6	X	X	X	X	X	X		
BH2	8			16/5				6	X	X	X	X	X	X		
BH4	9			16/5				7	X	X	X	X	X	X	X	
SW1	10			16/5				7	X	X	X	X	X	X	X	
SW4	11			16/5				7	X	X	X	X	X	X	X	
Rinsate 04	12			16/5				5	X	X	X				X	
Trip Blank 04	13			16/5				5	X	X	X				X	

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

Environmental Division
Sydney
Work Order Reference
ES1914860

Telephone : - 61-2-8784 8555

APPENDIX B5: JUNE 2019

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NEWCASTLE OFFICE

09 July 2019
Document Ref: NCA19R97643

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – June 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the June 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The June monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 June 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The June 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.375	2.265	8.12	Clear, no odour.
BH2	7.79	8.852	-1.062	9.02	Very cloudy, dark brown, no odour
BH3	7.57	6.005	1.565	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.723	1.337	5.92	Mildly cloudy, no odour.
BH5	7.36	5.823	1.537	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.713	1.907	4.52	Cloudy, slight sulfur odour
BH7	2.98	1.634	1.346	4.51	Slightly cloudy sulfur odour.
BH8	3.88	2.346	1.534	6.18	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.382	3.248	5.29	Cloudy with sulfur odour
BH12	8.67	6.832	1.838	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.344	1.696	3.89	Cloudy, sulfur odour.
MW239D	3.04	1.32	1.72	20.2	No odour – No sample taken
SW01*	N/A	0.14	2.51	N/A	Small pool of surface water with stained brown water.
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.15	1.1	N/A	Water clear, no odour.
SW04*	N/A	0.175	2.135	N/A	Water clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1230	19.97	111	6.43	33.6
BH02	1215	20.84	77	6.41	255
BH04	1145	19.01	55	6.41	321.9
BH06	1410	19.73	176	5.45	-104.7
BH07	1430	19.56	217	5.47	-227.9
BH08	1440	18.78	289	7.43	-340.8
BH11	1250	18.93	185	6.41	-78.5
MW239S	1350	19.3	305	5.7	-117.9
SW01	1140	14.5	811	6.4	298.4
SW03	1330	16.36	290	6.41	52.4
SW04	1045	13.34	313	6.44	377.3

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	1	11	6	77	No	Similar
	Sulphate	1	11	<1.0	182	No	Significant reduction at SW1
	Chloride	1	11	18	112	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive [3] Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous [3]	0.01	NA	NA	NA	NA	NA
	Nitrite [3]	0.01	NA	NA	NA	NA	NA
	Nitrate [3]	0.01	NA	NA	NA	NA	NA
	Ammonia [3]	0.01	NA	NA	NA	NA	NA
	Total Nitrogen [3]	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	7.0	190	No	Similar
	Total Dissolved Solids	1	11	45	550	No	Similar
	pH	0.01	11	4.31	5.52	All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.047	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0002	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	11	<0.001	0.002	3 above ANZECC 2000 Trigger Values[2]	Similar
	Co	0.001	11	<0.001	0.009	No	Similar
	Cu	0.001	11	<0.001	0.038	5 above ANZECC 2000 Trigger Values[2]	Similar
	Fe	0.05	11	<0.05	6.31	9 above NHMRC ADWG 6 aesthetics	Similar
	Mn	0.001	11	<0.05	0.666	1 above NHMRC ADWG 6 aesthetics	Similar
	Ni	0.001	11	<0.001	0.011	No	Similar
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	<0.005	0.535	4 above ANZECC 2000 Trigger Values[2]	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in June than the mean.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0						
2nd	0	12.8	0	23.8	0	21.2						
3rd	0	0.4		0.6	0	0.6						
4th	0	0	0	0	20.8	0.4						
5th	0	0	0	0	0.2	25						
6th	0	0	0	0	23.2	2.6						
7th	5.0	0	8.2	0	0.2	1						
8th	0	0	0	0	0	0						
9th	0	6.6	0	0	0	0						
10th	0.2	0	12.0	2.2	0	0						
11th	0	0	0	0	0.6	0						
12th	3.0	0	0	0	0	0						
13th	0	0	0	0	1.4	0						
14th	0	0	0	0.2	0	0						
15th	0	0	0	1.4	0	0						
16th	0	0	4.8	3.6	0	0						
17th	0	0	59.4	1.4	0	0						
18th	0	0	2.6	0.2	0	17.8						
19th	0	0	2.2	0.2	0	0						
20th	2.4		0	2.0	0	0						
21st	1.0	1.4	0	0.2	0	0						
22nd	0	1.0	1.2	0.2	0	0.2						
23rd	0	1.4	0	0	0	20						
24th	0	9.2	5.4	0	0	50.6						
25th	0	0	5.2	0	0	15.2						
26th	0	0	0	0	0	1.8						
27th	0	0	0	0	0	0.8						
28th	1.0	0	0	0	0.8	0						
29th	0		0	0	0	0						
30th	0		38.2	0	0	0						
31st	0		6.6		0							
Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**						
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.9**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data for June it is expected that the current groundwater and surface water levels maintain current levels.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

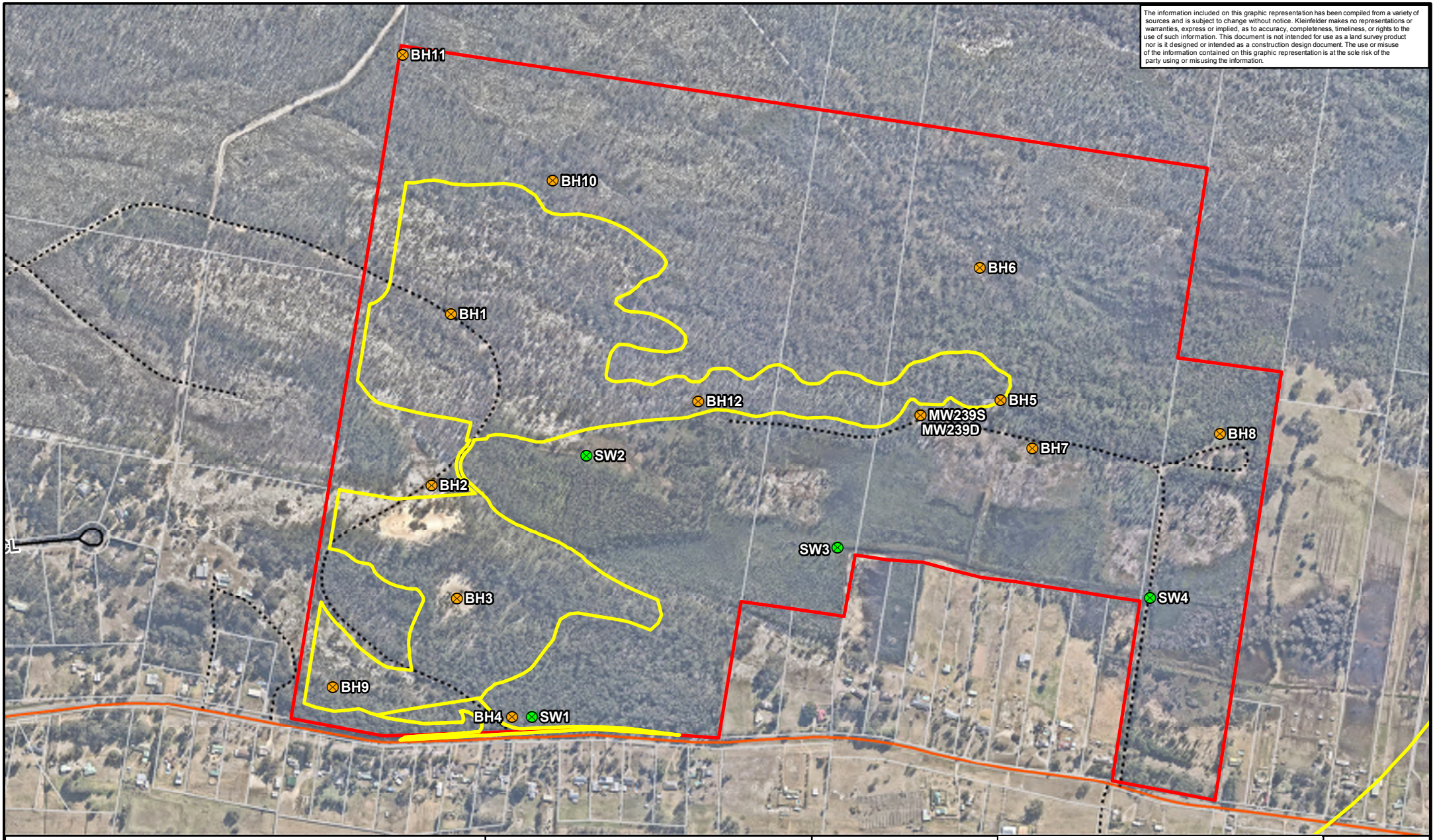
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

L:\GIS FOLDER\00 CLIENT FILES\126863_TrusteeForWSS_UnitTrust\20170448_Williamtown\Mapping\20170448_WMP_Fig2_WaterMonitoringPlan.mxd

DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6											0.56																		0.07		
HEPA NEMP 2018***						0.00023					19																				
HEPA NEMP 2018[4]											5.6																		0.7		
Sample Name	Sample Date																														
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW23BS	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
4 Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations															Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Alkalinity					Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N					Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	0.01	0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*			0.7**	0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
SW1	22-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	238	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Miligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{16}-C_{34} - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{16}-C_{40} - Silica Cleanup	F2 - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids					Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP03_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP03_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1918356**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 14-Jun-2019 15:59
Order number	:	Date Analysis Commenced	: 15-Jun-2019
C-O-C number	: ----	Issue Date	: 20-Jun-2019 15:30
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	MW239S	BH6	BH7	BH8	SW4
			Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.39	4.82	4.91	4.82	4.31
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	334	174	213	315	316
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	220	90	145	194	163
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	217	113	138	205	205
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	427	32	39	83	<5
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	25	21	16	20	33
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	7	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	16	11	4	39
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	87	42	56	89	60
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	<1	<1	5
Magnesium	7439-95-4	1	mg/L	6	4	4	5	5
Sodium	7440-23-5	1	mg/L	50	20	31	47	40
Potassium	7440-09-7	1	mg/L	<1	1	2	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.005	0.027	0.005	0.010	0.041
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	0.002	0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.001**	<0.001	<0.001	**0.003**
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.008**	**0.030**	**0.005**	**0.034**
Nickel	7440-02-0	0.001	mg/L		**0.001**	<0.001	**0.004**	**0.002**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.008**	**0.006**	**0.006**	**0.014**
Iron	7439-89-6	0.05	mg/L		**0.80**	**2.86**	**2.06**	**2.50**	**0.79**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	**0.1**	<0.1	<0.1
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.86**	**1.52**	**1.81**	**2.59**	**2.50**
ø Total Cations	----	0.01	meq/L		**2.67**	**1.32**	**1.73**	**2.46**	**2.40**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	<0.01	<0.01	<0.01	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**97.0**	**99.2**	**93.1**	**95.1**	**102**
Toluene-D8	2037-26-5	2	%		**121**	**127**	**112**	**115**	**107**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	BH6	BH7	BH8	SW4
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-001	ES1918356-002	ES1918356-003	ES1918356-004	ES1918356-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		114	120	110	114	110
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	97.9	92.4	97.8	----
13C8-PFOA	----	0.02	%		----	94.6	94.5	95.5	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH1	BH2	BH4	BH11	SW1
			Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	5.52	4.76	4.84	4.84	4.50
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	99	91	69	175	847
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	72	51	36	107	512
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	64	59	45	114	550
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	39	215	186	136	26
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	8	11	7	12	190
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	10	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	10	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	5	4	<1	182
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	24	23	18	53	112
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	1	1	<1	20
Magnesium	7439-95-4	1	mg/L	2	2	1	3	34
Sodium	7440-23-5	1	mg/L	10	11	6	26	77
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	5
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	0.09
Barium	7440-39-3	0.001	mg/L	0.001	0.004	0.012	0.004	0.029
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.009
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	<0.001	0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.001**	**0.004**	**0.038**	<0.001	**0.006**
Manganese	7439-96-5	0.001	mg/L		**0.009**	**0.009**	**0.014**	**0.005**	**0.595**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	**0.011**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.074**	<0.005	**0.005**	**0.005**	**0.535**
Iron	7439-89-6	0.05	mg/L		**6.31**	**0.08**	<0.05	**0.98**	**2.75**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	**0.4**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.94**	**0.75**	**0.59**	**1.50**	**6.95**
ø Total Cations	----	0.01	meq/L		**0.60**	**0.69**	**0.39**	**1.38**	**7.27**
ø Ionic Balance	----	0.01	%		**----**	**----**	**----**	**----**	**2.28**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**99.6**	**94.2**	**96.0**	**90.3**	**103**
Toluene-D8	2037-26-5	2	%		**128**	**119**	**119**	**112**	**130**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH11	SW1
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1918356-006	ES1918356-007	ES1918356-008	ES1918356-009	ES1918356-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**119**	**113**	**115**	**108**	**122**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**----**	**97.1**	**----**	**----**
13C8-PFOA	----	0.02	%		**----**	**----**	**99.6**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
			Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit	ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.58**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**300**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**170**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**195**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**12**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**42**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**41**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**55**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**7**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**6**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**32**	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L	**0.035**	**0.036**	<0.001	<0.001	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L	**0.003**	**0.003**	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L		**0.038**	**0.039**	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.003**	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		**0.016**	**0.013**	<0.005	<0.005	----
Iron	7439-89-6	0.05	mg/L		**1.68**	**1.63**	<0.05	<0.05	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**2.40**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**2.24**	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	--------
					Result	Result	Result	Result	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**94.8**	**92.5**	**93.2**	**88.7**	----
Toluene-D8	2037-26-5	2	%		**116**	**114**	**113**	**108**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW3	DUP05	RINSATE 05	TRIP BLANK 05	----
				Client sampling date / time	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	14-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1918356-011	ES1918356-012	ES1918356-013	ES1918356-014	--------
					Result	Result	Result	Result	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		112	108	109	105	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	99.3	101	----
13C8-PFOA	----	0.02	%		----	----	91.3	96.3	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1918356**	Page	: 1 of 15
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 14-Jun-2019
Order number	:	Date Analysis Commenced	: 15-Jun-2019
C-O-C number	: ----	Issue Date	: 20-Jun-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini		Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2407901)									
ES1918347-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.31	7.35	0.546	0% - 20%
ES1918356-001	MW239S	EA005-P: pH Value	----	0.01	pH Unit	5.39	4.94	8.71	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2407902)									
ES1918347-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3520	3580	1.78	0% - 20%
ES1918356-001	MW239S	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	334	329	1.54	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2410338)									
ES1918104-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2030	1990	2.19	0% - 20%
ES1918347-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1580	1670	5.74	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2410340)									
ES1918356-004	BH8	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	194	180	7.47	0% - 50%
ES1918538-007	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	648	640	1.09	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2414080)									
ES1918356-008	BH4	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	36	34	7.19	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2410337)									
ES1918104-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	172	169	1.47	0% - 20%
ES1918347-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	11	<5	73.0	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2410339)									
ES1918356-004	BH8	EA025H: Suspended Solids (SS)	----	5	mg/L	83	80	4.29	0% - 50%
ES1918538-007	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	31	34	8.56	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2414079)									
ES1918356-008	BH4	EA025H: Suspended Solids (SS)	----	5	mg/L	186	184	0.675	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2407900)									
ES1918347-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2407900) - continued									
ES1918347-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	479	503	4.83	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	479	503	4.83	0% - 20%
ES1918356-001	MW239S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	2	110	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	2	110	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2406923)									
ES1918276-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	547	532	2.90	0% - 20%
ES1918347-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	256	253	1.49	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2406926)									
ES1918356-003	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	11	13	15.7	0% - 50%
ES1918364-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	47	47	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2406924)									
ES1918276-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	179	179	0.00	0% - 20%
ES1918347-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	766	758	1.01	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2406925)									
ES1918356-003	BH7	ED045G: Chloride	16887-00-6	1	mg/L	56	55	0.00	0% - 20%
ES1918364-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1800	1790	0.592	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2409648)									
ES1918356-001	MW239S	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	50	50	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1918429-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	220	219	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	170	169	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	646	654	1.18	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	58	58	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2409647)									
ES1918356-001	MW239S	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2409647) - continued									
ES1918356-001	MW239S	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.80	0.81	0.00	0% - 50%
ES1918429-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.102	0.104	1.88	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	5.56	5.60	0.818	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.379	0.383	0.974	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.171	0.175	2.56	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.49	1.62	8.33	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.54	0.52	2.90	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2410246)									
ES1918347-008	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.021	0.021	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.025	9.81	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.10	0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.56	0.58	3.66	0% - 50%
ES1918347-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.024	0.024	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2410246) - continued									
ES1918347-001	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.009	0.009	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.11	0.11	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2409646)									
ES1918356-004	BH8	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1918356-010	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2410245)									
ES1918322-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1918347-006	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2407903)									
ES1918356-010	SW1	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
ES1918356-001	MW239S	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1918356-008	BH4	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1918356-008	BH4	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2411564)									
ES1918356-001	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1918356-008	BH4	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2411564) - continued									
ES1918356-008	BH4	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.08	1.00	7.12	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.05	16.9	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.04	28.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.38	0.33	16.0	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.03	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.18	0.16	15.7	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2411006) - continued									
EM1909131-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1918311-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2411006) - continued									
ES1918311-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2411006)									
EM1909131-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1918311-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.83	1.65	10.3	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2407901)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2407902)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2410338)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	97.0	87	109
				<10	293 mg/L	99.6	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2410340)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	94.8	87	109
				<10	293 mg/L	91.3	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2414080)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	98.6	87	109
				<10	293 mg/L	94.4	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2410337)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	104	83	129
				<5	1000 mg/L	106	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2410339)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.0	83	129
				<5	1000 mg/L	94.3	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2414079)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	103	83	129
				<5	1000 mg/L	93.5	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2407900)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	96.5	81	111
				----	50 mg/L	107	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406923)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406926)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.0	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2406924)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	105	81	127
				<1	1000 mg/L	92.0	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2406925)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 2406925) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	81	127
				<1	1000 mg/L	91.8	81	127
ED093F: Dissolved Major Cations (QCLot: 2409648)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	88.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.4	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.4	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.6	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2409647)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.6	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	91.2	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.6	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	86.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	89.7	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	88.5	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	86.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	86.8	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.3	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	91.6	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	88.6	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.0	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.5	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	94.0	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	89.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.5	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.2	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.5	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	88.0	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	92.5	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.9	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	99.4	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	88.4	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2409646)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.1	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2410245)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	85.2	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2407903)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	91.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2407984)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.4	75	117
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	84.3	81	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	74.9	71	117
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2407984)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	99.2	73	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	94.3	81	113
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	82.1	65	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2411564)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	82.2	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2411564)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.5	75	127
EP080: BTEXN (QCLot: 2411564)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	89.8	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.9	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.4	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	108	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	112	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	95.9	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2411006)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	120	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	115	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	124	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	110	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	125	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	124	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	130	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	128	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	126	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	110	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	112	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	122	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	129	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	125	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2411006)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	123	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	113	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	120	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	128	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406923)							
ES1918276-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406926)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2406926) - continued							
ES1918356-003	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2406924)							
ES1918276-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2406925)							
ES1918356-003	BH7	ED045G: Chloride	16887-00-6	250 mg/L	111	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2409647)							
ES1918356-002	BH6	EG020A-F: Arsenic	7440-38-2	1.2 mg/L	113	70	130
		EG020A-F: Beryllium	7440-41-7	1.2 mg/L	113	70	130
		EG020A-F: Barium	7440-39-3	1.2 mg/L	114	70	130
		EG020A-F: Cadmium	7440-43-9	0.31 mg/L	110	70	130
		EG020A-F: Chromium	7440-47-3	1.2 mg/L	124	70	130
		EG020A-F: Cobalt	7440-48-4	1.2 mg/L	126	70	130
		EG020A-F: Copper	7440-50-8	1.2 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	1.2 mg/L	127	70	130
		EG020A-F: Manganese	7439-96-5	1.2 mg/L	126	70	130
		EG020A-F: Nickel	7440-02-0	1.2 mg/L	120	70	130
		EG020A-F: Vanadium	7440-62-2	1.2 mg/L	120	70	130
		EG020A-F: Zinc	7440-66-6	1.2 mg/L	117	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2410246)							
ES1918330-007	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	89.0	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	88.6	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	91.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.0	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	91.6	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	88.2	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	90.6	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	108	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	92.7	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	86.8	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	90.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	90.6	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2409646)							
ES1918356-003	BH7	EG035F: Mercury	7439-97-6	0.01 mg/L	112	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2410245)							
ES1918259-007	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	104	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2407903)							
ES1918356-001	MW239S	EK040P: Fluoride	16984-48-8	5 mg/L	90.6	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: C6 - C9 Fraction	----	325 µg/L	77.3	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	76.3	70	130
EP080: BTEXN (QCLot: 2411564)							
ES1918356-001	MW239S	EP080: Benzene	71-43-2	25 µg/L	94.1	70	130
		EP080: Toluene	108-88-3	25 µg/L	96.2	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	87.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.9	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.2	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	79.2	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	118	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	128	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	118	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	126	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	125	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	122	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	119	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	126	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	129	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	122	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	128	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	121	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	130	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	128	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	123	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	114	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	114	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	126	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	119	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	118	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	118	50	150

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2411006) - continued							
EM1909131-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	128	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	128	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	126	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2411006)							
EM1909131-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	128	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	123	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	127	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	128	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1918356**	Page	: 1 of 11
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 14-Jun-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 20-Jun-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	:	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1918276--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
MW239S,	BH6,	----	----	----	17-Jun-2019	14-Jun-2019	**3**
BH7,	BH8,						
SW4,	BH1,						
BH2,	BH4,						
BH11,	SW1,						
SW3							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	16	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	14-Jun-2019	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	12-Jul-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**19-Jun-2019**	21-Jun-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**19-Jun-2019**	21-Jun-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	12-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	28-Jun-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**15-Jun-2019**	12-Jul-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**15-Jun-2019**	12-Jul-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	12-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	11-Dec-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**----**	----	----	**18-Jun-2019**	11-Dec-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**----**	----	----	**18-Jun-2019**	12-Jul-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3	**14-Jun-2019**	**----**	----	----	**17-Jun-2019**	12-Jul-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	21-Jun-2019	✓	**19-Jun-2019**	28-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	21-Jun-2019	✓	**19-Jun-2019**	28-Jul-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**19-Jun-2019**	28-Jun-2019	✓	**19-Jun-2019**	28-Jun-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**19-Jun-2019**	28-Jun-2019	✓	**19-Jun-2019**	28-Jun-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW239S, BH6, BH7, BH8, SW4, BH1, BH2, BH4, BH11, SW1, SW3, DUP05, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**19-Jun-2019**	28-Jun-2019	✓	**19-Jun-2019**	28-Jun-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	11-Dec-2019	✓	**18-Jun-2019**	11-Dec-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	11-Dec-2019	✓	**18-Jun-2019**	11-Dec-2019	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	11-Dec-2019	✓	**18-Jun-2019**	11-Dec-2019	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	11-Dec-2019	✓	**18-Jun-2019**	11-Dec-2019	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH6, BH7, BH8, BH4, RINSATE 05, TRIP BLANK 05	**14-Jun-2019**	**18-Jun-2019**	11-Dec-2019	✓	**18-Jun-2019**	11-Dec-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	5	44	**11.36**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	5	43	**11.63**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	6	44	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	43	**13.95**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	44	**6.82**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	43	**6.98**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	16	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1918356**

Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dkousbroek@kleinfelder.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 20193820	Page	: 1 of 3
Order number	:	Quote number	: EM2019ALLENVENG0010 (ME/114/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Sampler	: DANIEL KOUSBROEK		

Dates

Date Samples Received	: 14-Jun-2019 15:59	Issue Date	: 14-Jun-2019
Client Requested Due Date	: 20-Jun-2019	Scheduled Reporting Date	: **20-Jun-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 2.7'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample TRI05 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-12 General Water Suite	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1918356-001	14-Jun-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1918356-002	14-Jun-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1918356-003	14-Jun-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1918356-004	14-Jun-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1918356-005	14-Jun-2019 00:00	SW4	✓	✓	✓		✓	✓	✓
ES1918356-006	14-Jun-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1918356-007	14-Jun-2019 00:00	BH2	✓	✓	✓		✓	✓	✓
ES1918356-008	14-Jun-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1918356-009	14-Jun-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1918356-010	14-Jun-2019 00:00	SW1	✓	✓	✓		✓	✓	✓
ES1918356-011	14-Jun-2019 00:00	SW3	✓	✓	✓		✓	✓	✓
ES1918356-012	14-Jun-2019 00:00	DUP05			✓			✓	✓
ES1918356-013	14-Jun-2019 00:00	RINSATE 05			✓	✓		✓	✓
ES1918356-014	14-Jun-2019 00:00	TRIP BLANK 05			✓	✓		✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676	
	Job No.:	20199820	Contact e-mail:	dkousbroek@kleinfelder.com	
	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	
	Data QA level:	LAB minimum unless specified	PM e-mail:	toverton@kleinfelder.com	

CHAIN OF CUSTODY

Relinquished by (print):	Daniel Kousbroek	Received by (print):		Relinquished:		Received by:	AS
(sign)		(sign)		(sign)		(sign)	
Date / Time:	14/6.	Date / Time:	14/6 4:00pm	Date / Time:	14/6/19 5	Date / Time:	14/6/19 19:20
Notes:		Temp. (°C)	-1.1	Notes:		Temp. (°C)	
		Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal

Send Results to:
dkousbroek@kleinfelder.com & toverton@kleinfelder.com
95 Mitchell Road
Cardiff, NSW 2285
newcastle@kleinfelder.com
Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG TRH/BTEXN	Metals: W-03 Metals_NEPM 15	Metals: Iron (dissolved)	Other Analytes: General Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: EP231X PFAS (28 analytes, standard level)	Comments
MW29S	1			14/6				5	X	X	X	X	X	X		
BH6	2							6	X	X	X	X	X	X	X	
BH7	3							6	X	X	X	X	X	X	X	
BH8	4							6	X	X	X	X	X	X	X	
SW4	5							5	X	X	X	X	X	X		
BH1	6							5	X	X	X	X	X	X		
BH2	7							5	X	X	X	X	X	X		
BH4	8							6	X	X	X	X	X	X	X	
BH11	9							5	X	X	X	X	X	X		
SW1	10							5	X	X	X	X	X	X		
SW3	11							5	X	X	X	X	X	X		
Trip 05								4	X	X	X					*Send to Eurofins
Rep 05	12							4	X	X	X					
Rinsate 05	13							5	X	X	X				X	
Trip Blank 05	14			↓				5	X	X	X				X	

LAB OF ORIGIN: NEWCASTLE

Environmental Division
Sydney
Work Order Reference
ES1918356

Telephone : +61-2-8784 8555

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name	WSS - Cabbage Tree Rd water monitoring	Sampler Name	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number	045 8197 675	
	Job No.	20193820	Contact e-mail	dkousbroek@kleinfelder.com	
	Required TAT	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler)	Tom Overton	
	Data QA level	LAB maximum unless specified	PM e-mail	toverton@kleinfelder.com	

CHAIN OF CUSTODY

Relinquished by (print) / (sign)	Daniel Kousbroek	Received by (print) / (sign)		Relinquished (sign)		Received by (sign)	Grace Enfam
Date / Time	14/6.	Date / Time	14/6 4:00pm	Date / Time		Date / Time	17/6 2:31
Notes		Temp (°C)	~2-7	Notes		Temp (°C)	16.7 C
		Notes	ice present / no ice seals intact / no seal			Notes	ice present / no ice seals intact / no seal

Send Results to:
dkousbroek@kleinfelder.com & toverton@kleinfelder.com
95 Mitchell Road
Cardiff, NSW 2285
newcastle@kleinfelder.com
Phone: 02 4949 5200

	Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-66 SG TRH/BTEXN	Metals: W-03 Metals_NEPM 15	Metals: Iron (dissolved)	Other Analytes: General Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: EP231X PFAS (28 analytes, standard level)	Comments
1	MW29S				14/6				5	X	X	X	X	X	X		
2	BH6								5	X	X	X	X	X	X		
3	BH7	TRIPOS / Eurofins							6	X	X	X	X	X	X	X	
4	BH8	Gibson / Forward Lab / Split WO							6	X	X	X	X	X	X	X	
5	SW4	Lab / Analysis							5	X	X	X	X	X	X		
6	BH1	Organised By / Date:							5	X	X	X	X	X	X		
7	BH2	Relinquished By / Date:							5	X	X	X	X	X	X		
8	BH4	Connote / Courier:							6	X	X	X	X	X	X	X	
9	BH11	WO							5	X	X	X	X	X	X		
10	SW1	Attach							5	X	X	X	X	X	X		
11	SW3								5	X	X	X	X	X	X		
12	Trip 05								4	X	X	X					*Send to Eurofins
13	Rinsate 05								4	X	X	X					
14	Trip Blank 05								5	X	X	X				X	
																X	

Environmental Division
Sydney
Work Order Reference
ES1918356

Telephone : +61-2-8784 8555

W-66 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

661102

Melbourne
6 Monterey Road
Dandenong South Vic 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name:	Tom Overton
Project name:	WSS CABBAGE TREE RD WATER MONITORING
Project ID:	20193820
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Jun 17, 2019
Eurofins | mgt reference:	**661102**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☒ All samples have been received as described on the above COC.

☒ COC has been completed correctly.

☒ Attempt to chill was evident.

☒ Appropriately preserved sample containers have been used.

☒ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☒ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tom Overton - toverton@kleinfelder.com.

ABN – 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**		**Received:**	Jun 17, 2019 12:00 AM
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	661102	**Due:**	Jun 24, 2019
		Phone:	02 4949 5200	**Priority:**	5 Day
		Fax:		**Contact Name:**	Tom Overton
Project Name:	WSS CABBAGE TREE RD WATER MONITORING				
Project ID:	20193820				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins | mgt Suite B6 (filtered metals)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TRIP05	Not Provided		Water	S19-Jn18201	X	X	X
Test Counts						1	1	1

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Tom Overton**

Report **661102-W**
Project name WSS CABBAGE TREE RD WATER MONITORING
Project ID 20193820
Received Date Jun 17, 2019

Client Sample ID			**TRIP05**
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**S19-Jn18201**
Date Sampled			**Not Provided**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	109
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	1.6
Lead (filtered)	0.001	mg/L	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Zinc (filtered)	0.005	mg/L	0.010

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6 (filtered metals)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 17, 2019	14 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8 filtered	Sydney	Jun 17, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Jun 18, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**		**Received:**	Jun 17, 2019 12:00 AM
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	661102	**Due:**	Jun 24, 2019
		Phone:	02 4949 5200	**Priority:**	5 Day
		Fax:		**Contact Name:**	Tom Overton
Project Name:	WSS CABBAGE TREE RD WATER MONITORING				
Project ID:	20193820				

Eurofins | mgt Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins | mgt Suite B6 (filtered metals)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TRIP05	Not Provided		Water	S19-Jn18201	X	X	X
Test Counts						1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	75			70-130	Pass	
TRH C10-C14	%	84			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	89			70-130	Pass	
Ethylbenzene	%	86			70-130	Pass	
m&p-Xylenes	%	86			70-130	Pass	
o-Xylene	%	89			70-130	Pass	
Xylenes - Total	%	87			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	85			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
TRH >C10-C16	%	85			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	74			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium (filtered)			%	76			70-130	Pass	
Chromium (filtered)			%	77			70-130	Pass	
Copper (filtered)			%	79			70-130	Pass	
Iron (filtered)			%	81			70-130	Pass	
Lead (filtered)			%	81			70-130	Pass	
Mercury (filtered)			%	79			70-130	Pass	
Nickel (filtered)			%	81			70-130	Pass	
Zinc (filtered)			%	87			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Jn13611	NCP	%	100			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Jn13611	NCP	%	100			70-130	Pass	
Toluene	S19-Jn13611	NCP	%	102			70-130	Pass	
Ethylbenzene	S19-Jn13611	NCP	%	100			70-130	Pass	
m&p-Xylenes	S19-Jn13611	NCP	%	98			70-130	Pass	
o-Xylene	S19-Jn13611	NCP	%	101			70-130	Pass	
Xylenes - Total	S19-Jn13611	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Jn13611	NCP	%	102			70-130	Pass	
TRH C6-C10	S19-Jn13611	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Cadmium (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Chromium (filtered)	S19-Jn21508	NCP	%	87			70-130	Pass	
Copper (filtered)	S19-Jn21508	NCP	%	89			70-130	Pass	
Iron (filtered)	S19-Jn21508	NCP	%	83			70-130	Pass	
Lead (filtered)	S19-Jn21508	NCP	%	89			70-130	Pass	
Mercury (filtered)	S19-Jn21508	NCP	%	86			70-130	Pass	
Nickel (filtered)	S19-Jn21508	NCP	%	90			70-130	Pass	
Zinc (filtered)	S19-Jn21508	NCP	%	77			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Jn23494	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Jn23494	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Jn23494	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Jn23494	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Jn23494	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-Jn14272	NCP	mg/L	0.15	0.13	14	30%	Pass	
Cadmium (filtered)	S19-Jn14272	NCP	mg/L	0.19	0.17	14	30%	Pass	
Chromium (filtered)	S19-Jn14272	NCP	mg/L	2.3	2.4	6.0	30%	Pass	
Copper (filtered)	S19-Jn14272	NCP	mg/L	0.78	0.83	6.0	30%	Pass	
Iron (filtered)	S19-Jn14272	NCP	mg/L	2600	2500	4.0	30%	Pass	
Lead (filtered)	S19-Jn14272	NCP	mg/L	3.6	3.3	9.0	30%	Pass	
Mercury (filtered)	S19-Jn14272	NCP	mg/L	0.088	0.089	1.0	30%	Pass	
Nickel (filtered)	S19-Jn14272	NCP	mg/L	3.6	3.1	15	30%	Pass	
Zinc (filtered)	S19-Jn14272	NCP	mg/L	1300	1300	3.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	No
Appropriate sample containers have been used	No
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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APPENDIX B6: JULY 2019

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NEWCASTLE OFFICE

20 August 2019
Document Ref: NCA19R99532

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – July 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the July 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The July monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 16 July 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The July 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	1	1	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.373	2.267	8.12	Slightly cloudy, no apparent odour
BH2	7.79	5.083	2.707	9.02	Dark, cloudy, no odour
BH3	7.57	5.938	1.632	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.617	1.443	5.92	Cloudy, no odour.
BH5	7.36	5.779	1.581	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.591	2.029	4.52	Slightly cloudy, no odour
BH7	2.98	1.544	1.436	4.51	Slightly cloudy sulfur odour.
BH8	3.88	2.266	1.614	6.18	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.348	3.282	5.29	Cloudy no odour
BH12	8.67	6.799	1.871	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.262	1.778	3.89	Cloudy, sulfur odour.
MW239D	3.04	1.239	1.801	20.2	No odour – No sample taken
SW01*	N/A	0.2	2.7	N/A	Dark brown, no odour, slight sheen
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.215	1.215	N/A	Water clear, no odour.
SW04*	N/A	0.281	2.281	N/A	Light brown, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1145	18.4	122	5.42	51
BH02	1130	18.3	124.5	4.76	88
BH04	1100	17.6	91.5	4.78	88
BH06	1330	17.2	191	4.54	101
BH07	1400	17.2	228	4.58	100
BH08	1430	16.8	347	4.55	101
BH11	1215	16.9	296	4.53	101
MW239S	1315	15.8	37	4.67	94
SW01	1105	9.7	827	4.56	99
SW03	1245	14.6	431	4.27	116
SW04	0930	9.9	371	4.23	116

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	1	11	10	90	No	Similar
	Sulphate	1	11	4	240	No	Similar
	Chloride	1	11	18	130	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive [3] Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous [3]	0.01	NA	NA	NA	NA	NA
	Nitrite [3]	0.01	NA	NA	NA	NA	NA
	Nitrate [3]	0.01	NA	NA	NA	NA	NA
	Ammonia [3]	0.01	NA	NA	NA	NA	NA
	Total Nitrogen [3]	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	8.0	194	No	Similar
	Total Dissolved Solids	1	11	49	569	No	Similar
	pH	0.01	11	4.42	5.62	All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.08	No	Similar
	Ba	0.001	11	0.002	0.055	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.007	No	Similar
	Cu	0.001	11	<0.001	0.046	7 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH4, BH6, SW1, SW3,0 & SW4)	Similar
	Fe	0.05	11	<0.05	7.35	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	<0.05	0.59	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	Ni	0.001	11	<0.001	0.008	No	Similar
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	<0.005	0.239	4 above ANZECC 2000 Trigger Values[2] (BH1, SW1, SW3 & SW4)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	HEPA NEMP 2018*	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in June than the mean leading up to the July monitoring event. July rainfall is trending towards below average rainfall.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0					
2nd	0	12.8	0	23.8	0	21.2	0					
3rd	0	0.4		0.6	0	0.6	0					
4th	0	0	0	0	20.8	0.4	5.2					
5th	0	0	0	0	0.2	25	1.8					
6th	0	0	0	0	23.2	2.6	1.2					
7th	5.0	0	8.2	0	0.2	1	0.6					
8th	0	0	0	0	0	0	1.6					
9th	0	6.6	0	0	0	0	0.4					
10th	0.2	0	12.0	2.2	0	0	0					
11th	0	0	0	0	0.6	0	0					
12th	3.0	0	0	0	0	0	0					
13th	0	0	0	0	1.4	0	0					
14th	0	0	0	0.2	0	0	0					
15th	0	0	0	1.4	0	0	0					
16th	0	0	4.8	3.6	0	0	0					
17th	0	0	59.4	1.4	0	0						
18th	0	0	2.6	0.2	0	17.8						
19th	0	0	2.2	0.2	0	0						
20th	2.4		0	2.0	0	0						
21st	1.0	1.4	0	0.2	0	0						
22nd	0	1.0	1.2	0.2	0	0.2						
23rd	0	1.4	0	0	0	20						
24th	0	9.2	5.4	0	0	50.6						
25th	0	0	5.2	0	0	15.2						
26th	0	0	0	0	0	1.8						
27th	0	0	0	0	0	0.8						
28th	1.0	0	0	0	0.8	0						
29th	0		0	0	0	0						
30th	0		38.2	0	0	0						
31st	0		6.6		0							
Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**9.2**					
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data for the June/July period it is expected that the current groundwater and surface water levels will remain similar compared to current levels.

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

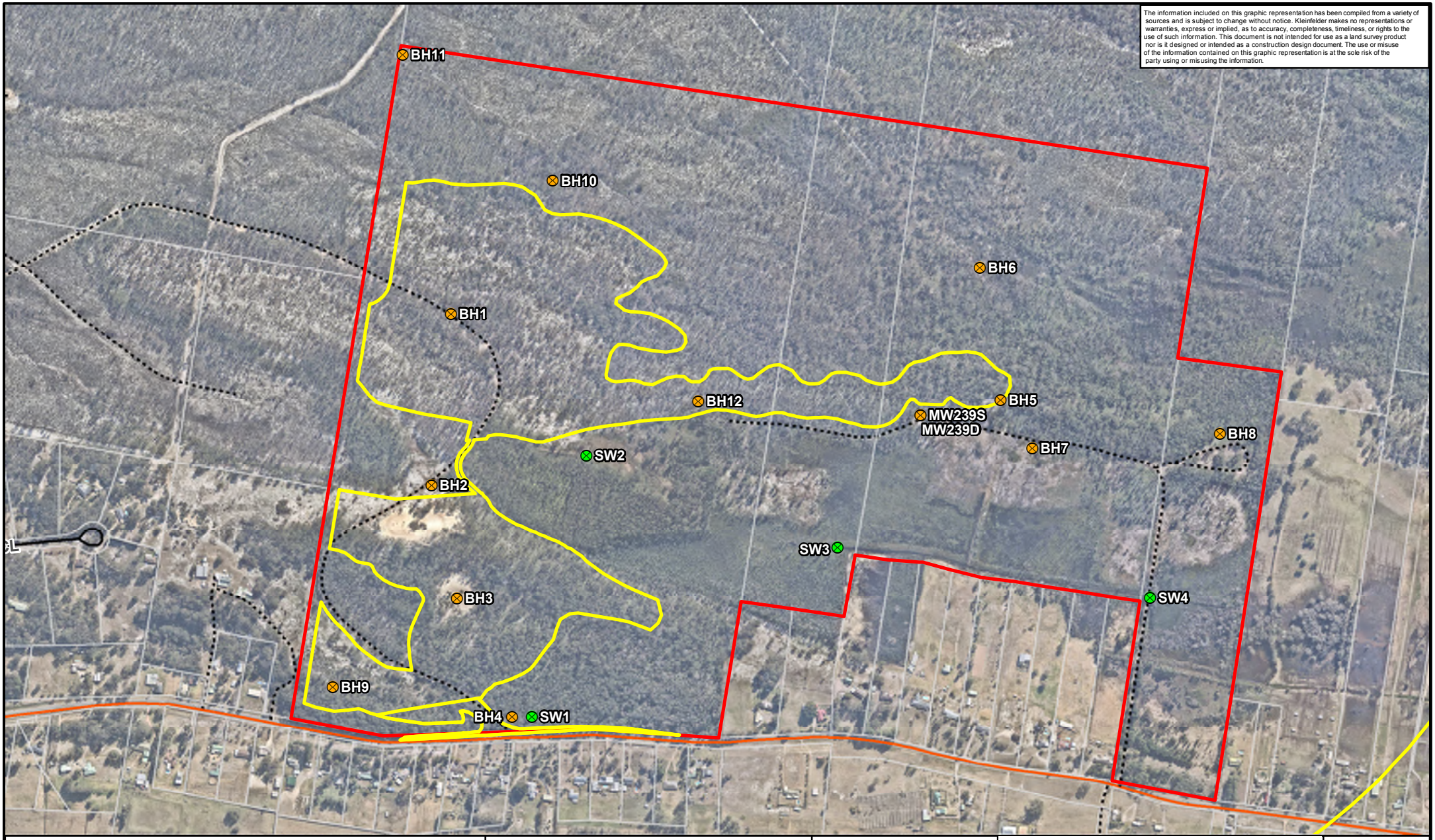
Attached:

Figure 1

Data Tables

Attachment A – Laboratory reports

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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Bright People. Right Solutions.
www.kleinfelder.com

PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium** [1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate

Analyte		Perfluorosulfonic Acids						Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorododecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (PFOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56																	0.07		
HEPA NEMP 2018***						0.00023						19																			
HEPA NEMP 2018												5.6																	0.7		
Sample Name	Sample Date																														
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH7	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01

Notes:
-- Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
^ Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																Alkalinity						Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	1	0.01	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*				0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	0.69	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	238	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Analyte			Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_19062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 05_19062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 06_26072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE06_26072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1922172**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Jul-2019 15:55
Order number	:	Date Analysis Commenced	: 16-Jul-2019
C-O-C number	: ----	Issue Date	: 22-Jul-2019 19:07
Sampler	: DK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EN055: Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH1	BH2	BH4	BH6	BH7
			Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	5.62	4.84	4.96	4.73	5.00
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	102	90	75	161	202
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	84	63	42	82	164
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	66	58	49	105	131
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	26	92	74	23	61
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	8	13	13	21	20
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	11	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	9	6	20	12
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	23	20	18	35	46
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	2	2	2	<1
Magnesium	7439-95-4	1	mg/L	2	2	2	4	5
Sodium	7440-23-5	1	mg/L	15	13	10	23	36
Potassium	7440-09-7	1	mg/L	<1	<1	1	1	2
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.002	0.004	0.013	0.026	0.005
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L	0.003	<0.001	<0.001	<0.001	0.002

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.008**	**0.046**	**0.002**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.010**	**0.013**	**0.019**	**0.008**	**0.025**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.001**	<0.001	<0.001	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.116**	**0.006**	**0.007**	**0.005**	<0.005
Iron	7439-89-6	0.05	mg/L		**7.35**	**0.05**	<0.05	**2.41**	**1.66**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.95**	**0.75**	**0.63**	**1.40**	**1.55**
ø Total Cations	----	0.01	meq/L		**0.82**	**0.83**	**0.72**	**1.46**	**2.03**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**121**	**118**	**86.7**	**116**	**116**
Toluene-D8	2037-26-5	2	%		**131**	**129**	**110**	**124**	**129**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-001	ES1922172-002	ES1922172-003	ES1922172-004	ES1922172-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**118**	**119**	**98.5**	**113**	**115**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**----**	**98.6**	**96.5**	**98.4**
13C8-PFOA	----	0.02	%		**----**	**----**	**86.9**	**88.0**	**81.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH8	BH11	SW1	SW3	SW4
			Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit	ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	4.78	4.68	4.42	4.47	4.46
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	353	318	876	451	367
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	226	192	568	246	207
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	229	207	569	293	238
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	145	223	17	7	6
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	20	33	194	69	46
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	70	8	240	104	67
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	121	73	130	57	56
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	20	8	7
Magnesium	7439-95-4	1	mg/L	5	8	35	12	7
Sodium	7440-23-5	1	mg/L	57	49	90	46	46
Potassium	7440-09-7	1	mg/L	<1	<1	4	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.08	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.012	0.010	0.032	0.055	0.044
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.007	0.007	0.002
Chromium	7440-47-3	0.001	mg/L	0.001	0.002	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.003**	**0.002**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.003**	**0.590**	**0.043**	**0.043**
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.004**	**0.008**	**0.006**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.007**	**0.239**	**0.029**	**0.014**
Iron	7439-89-6	0.05	mg/L		**2.60**	**0.47**	**1.86**	**1.25**	**0.96**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	**0.2**	**0.4**	**0.2**	**0.2**
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**4.87**	**2.22**	**8.66**	**3.77**	**2.97**
ø **Total Cations**	----	0.01	meq/L		**2.89**	**2.79**	**7.90**	**3.39**	**2.93**
ø **Ionic Balance**	----	0.01	%		**25.5**	**----**	**4.64**	**5.38**	**----**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**121**	**122**	**114**	**111**	**123**
Toluene-D8	2037-26-5	2	%		**130**	**127**	**128**	**115**	**126**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	SW1	SW3	SW4
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00
Compound	CAS Number	LOR	Unit		ES1922172-006	ES1922172-007	ES1922172-008	ES1922172-009	ES1922172-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**120**	**116**	**115**	**113**	**117**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**102**	**----**	**----**	**----**	**----**
13C8-PFOA	----	0.02	%		**79.4**	**----**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
			Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1922172-011	ES1922172-012	ES1922172-013	--------	--------
				Result	Result	Result	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**4.85**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**353**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**188**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**229**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**70**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**29**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**16**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**73**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**7**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**52**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	**0.006**	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	<0.001	<0.001	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**0.87**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**2.39**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**2.86**	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		122	131	122	----	----
Toluene-D8	2037-26-5	2	%		127	123	125	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW239S	RINSATE06	TRIP BLANK 06	----	----
				Client sampling date / time	16-Jul-2019 00:00	16-Jul-2019 00:00	16-Jul-2019 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1922172-011	ES1922172-012	ES1922172-013	--------	--------
					Result	Result	Result	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**116**	**121**	**117**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**108**	**102**	**----**	**----**
13C8-PFOA	----	0.02	%		**----**	**76.5**	**74.6**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1922172**	Page	: 1 of 14
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Jul-2019
Order number	:	Date Analysis Commenced	: 16-Jul-2019
C-O-C number	: ----	Issue Date	: 22-Jul-2019
Sampler	: DK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 13		
No. of samples analysed	: 13		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 2469956)									
ES1922172-001	BH1	EA005: pH Value	----	0.01	pH Unit	5.62	5.62	0.00	0% - 20%
ES1922172-011	MW239S	EA005: pH Value	----	0.01	pH Unit	4.85	4.81	0.828	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2469265)									
ES1922084-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	146	145	0.974	0% - 20%
ES1922135-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	14900	14700	1.73	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2469270)									
ES1922172-006	BH8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	353	344	2.66	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2472613)									
ES1921959-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	300	305	1.82	0% - 20%
ES1922128-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	158	130	20.1	0% - 50%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2472615)									
ES1922172-005	BH7	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	164	156	5.32	0% - 50%
ES1922387-002	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	624	672	7.33	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2472612)									
ES1921959-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	90	86	5.13	0% - 50%
ES1922128-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2472614)									
ES1922172-005	BH7	EA025H: Suspended Solids (SS)	----	5	mg/L	61	56	8.07	0% - 50%
ES1922387-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	9	8	14.5	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2469269)									
ES1922135-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	56	56	0.00	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2469269) - continued									
ES1922135-002	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	56	56	0.00	0% - 20%
ES1922172-006	BH8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2471507)									
ES1922082-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	14	14	0.00	0% - 50%
ES1922082-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	19	17	8.91	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2471509)									
ES1922172-002	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	9	9	0.00	No Limit
ES1922172-011	MW239S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	16	18	9.50	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 2471508)									
ES1922082-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	64	65	0.00	0% - 20%
ES1922082-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	104	104	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2471510)									
ES1922172-005	BH7	ED045G: Chloride	16887-00-6	1	mg/L	46	46	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2474824)									
ES1922172-006	BH8	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	57	56	1.98	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1921898-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	19	19	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2474825)									
ES1922172-006	BH8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.012	0.012	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2474825) - continued									
ES1922172-006	BH8	EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.60	2.66	2.10	0% - 20%
ES1921898-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.048	0.047	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.006	0.007	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.011	70.3	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.61	1.60	0.760	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2476219)									
ES1922095-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.035	0.035	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.462	0.464	0.388	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.050	0.051	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.012	35.7	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	1.35	1.36	0.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2474826)									
ES1922133-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	0.00	No Limit
ES1922172-005	BH7	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2476220)									
ES1922172-013	TRIP BLANK 06	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2469266)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK040P: Fluoride by PC Titrator (QC Lot: 2469266) - continued									
ES1922084-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	0.00	No Limit
ES1922135-002	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	0.2	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2469272)									
ES1922172-006	BH8	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1922172-004	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1922172-004	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2470517)									
EP1906947-008	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1922172-004	BH6	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.14	0.15	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.22	0.22	0.00	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2470152)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2470152) - continued									
EP1906907-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1922172-006	BH8	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2470152) - continued									
ES1922172-006	BH8	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1922172-006	BH8	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2470152)									
EP1906907-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.44	0.46	4.44	0% - 20%
ES1922172-006	BH8	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 2469956)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	100	99	102
EA010P: Conductivity by PC Titrator (QCLot: 2469265)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	110	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2469270)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2472613)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.7	87	109
				<10	293 mg/L	100	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2472615)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	96.7	87	109
				<10	293 mg/L	98.3	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2472612)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.7	83	129
				<5	1000 mg/L	103	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2472614)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	94.3	83	129
				<5	1000 mg/L	108	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2469269)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	93.4	81	111
				----	50 mg/L	93.4	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471507)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471509)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2471508)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	81	127
				<1	1000 mg/L	87.0	81	127
ED045G: Chloride by Discrete Analyser (QCLot: 2471510)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	81	127
				<1	1000 mg/L	87.3	81	127
ED093F: Dissolved Major Cations (QCLot: 2474824)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	110	90	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 2474824) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2474825)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	96.9	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.7	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.5	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.5	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.5	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	92.7	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.7	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2476219)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.0	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	88.8	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	97.0	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.3	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.2	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	90.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	89.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	96.1	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	89.1	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.1	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.6	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2474826)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2476220)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	83	105

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK040P: Fluoride by PC Titrator (QCLot: 2469266)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	96.2	82	116
EK040P: Fluoride by PC Titrator (QCLot: 2469272)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	90.6	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2469985)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	62.7	56	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	83.0	72	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	79.2	56	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2469985)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	70.5	58	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	82.0	63	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	67.8	62	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2470517)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	96.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2470517)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.6	75	127
EP080: BTEXN (QCLot: 2470517)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	108	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	104	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	103	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	104	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2470152)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	93.0	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	93.2	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	90.4	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	77.2	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	92.2	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	99.0	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.8	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	97.8	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.2	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	107	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2470152)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	89.2	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	98.7	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	111	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	101	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	99.3	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2470152)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	98.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	105	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471507)							
ES1922082-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	129	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2471509)							
ES1922172-002	BH2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	77.6	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2471508)							
ES1922082-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2471510)							
ES1922172-005	BH7	ED045G: Chloride	16887-00-6	250 mg/L	103	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2474825)							
ES1921898-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	95.8	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.3	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	98.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	98.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.3	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	100	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	96.3	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	95.9	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.3	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.0	70	130
		EG020A-F: Zinc	7440-66-6	5 mg/L	96.4	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2476219)							
ES1922172-012	RINSATE06	EG020A-F: Arsenic	7440-38-2	1 mg/L	119	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	114	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	122	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	124	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	128	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	129	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	121	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	128	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	121	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	123	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	119	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	127	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2474826)							
ES1922133-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	89.8	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2476220)							
ES1922172-012	RINSATE06	EG035F: Mercury	7439-97-6	0.01 mg/L	113	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2469266)							
ES1922084-008	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	105	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2469272)							
ES1922172-007	BH11	EK040P: Fluoride	16984-48-8	5 mg/L	90.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	107	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2470517)							
EP1906947-008	Anonymous	EP080: Benzene	71-43-2	25 µg/L	114	70	130
		EP080: Toluene	108-88-3	25 µg/L	108	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	106	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	108	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	111	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	110	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	101	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	107	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	106	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	106	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	110	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	81.0	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	111	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	110	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	98.6	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	127	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	118	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	120	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	99.0	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	115	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	107	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	128	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	96.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	97.2	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	129	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	110	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	111	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	96.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	107	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2470152)							
EP1906907-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	108	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	130	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	128	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	116	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1922172**	Page	: 1 of 10
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Jul-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 22-Jul-2019
Sampler	: DK	No. of samples received	: 13
Order number	:	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel C	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA005: pH							
Clear Plastic Bottle - Natural (EA005)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**16-Jul-2019**	16-Jul-2019	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**16-Jul-2019**	13-Aug-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**18-Jul-2019**	23-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**18-Jul-2019**	23-Jul-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**19-Jul-2019**	13-Aug-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**16-Jul-2019**	30-Jul-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**17-Jul-2019**	13-Aug-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**17-Jul-2019**	13-Aug-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**19-Jul-2019**	13-Aug-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**----**	----	----	**19-Jul-2019**	12-Jan-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**----**	----	----	**19-Jul-2019**	13-Aug-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S	**16-Jul-2019**	**----**	----	----	**16-Jul-2019**	13-Aug-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**18-Jul-2019**	23-Jul-2019	✓	**20-Jul-2019**	27-Aug-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**18-Jul-2019**	23-Jul-2019	✓	**20-Jul-2019**	27-Aug-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**19-Jul-2019**	30-Jul-2019	✓	**19-Jul-2019**	30-Jul-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**19-Jul-2019**	30-Jul-2019	✓	**19-Jul-2019**	30-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, SW1, SW3, SW4, MW239S, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**19-Jul-2019**	30-Jul-2019	✓	**19-Jul-2019**	30-Jul-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**17-Jul-2019**	12-Jan-2020	✓	**18-Jul-2019**	12-Jan-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**17-Jul-2019**	12-Jan-2020	✓	**18-Jul-2019**	12-Jan-2020	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**17-Jul-2019**	12-Jan-2020	✓	**18-Jul-2019**	12-Jan-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**17-Jul-2019**	12-Jan-2020	✓	**18-Jul-2019**	12-Jan-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE06, TRIP BLANK 06	**16-Jul-2019**	**17-Jul-2019**	12-Jan-2020	✓	**18-Jul-2019**	12-Jan-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	18	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	25	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	3	26	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	25	**8.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	26	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	0	15	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel C	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

KLEINFELDER AUSTRALIA PTY LTD

COC number:

KLEINFELDER
Bright People. Right Solutions.

Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek	ALS
95 Mitchell Road	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676	5/585 Maitland Rd
Cardiff,	Job No.:	20193820	Contact e-mail:	dkousbroek@kleinfelder.com	Mayfield West,
NSW 2285	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	Newcastle NSW 2304
Phone: 02 4949 5200	Data QA level:	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com	Phone: (02) 4014 2500

CHAIN OF CUSTODY								Send Results to:
Relinquished by (print):	Daniel Kousbroek	Received by (print):	M·M	Relinquished:		Received by:	AJ	dkousbroek@kleinfelder.com & toverton@kleinfelder.com
(sign)		(sign)		(sign)		(sign)		95 Mitchell Road
Date / Time:	16/7. 1555	Date / Time:	16/7/19	Date / Time:		Date / Time:	16/7/19	Cardiff, NSW 2285
		Temp. (°C)	3-55pm			Temp. (°C)	19.3	
Notes:		Notes:	ice present / no ice seals intact / no seal	Notes:		Notes:	ice present / no ice seals intact / no seal	newcastle@kleinfelder.com Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG TRH/BTEXN	Metals: W-03 Metals_NEPM 15	Metals: Iron (dissolved)	Other Analytes: NT 12 - General Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: EP231X PFAS (28 analytes, standard level)	Comments
BH1	1			16/07/2019				5	X	X	X	X	X	X		
BH2	2			16/07/2019				5	X	X	X	X	X	X		
BH4	3			16/07/2019				6	X	X	X	X	X	X	X	
BH6	4			16/07/2019				6	X	X	X	X	X	X	X	
BH7	5			16/07/2019				6	X	X	X	X	X	X	X	
BH8	6			16/07/2019				6	X	X	X	X	X	X	X	
BH11	7			16/07/2019				5	X	X	X	X	X	X		
SW1	8			16/07/2019				5	X	X	X	X	X	X		
SW3	9			16/07/2019				5	X	X	X	X	X	X		
SW4	10			16/07/2019				5	X	X	X	X	X	X		
MW239S	11			16/07/2019				5	X	X	X	X	X	X		
Rinsate06	12			16/07/2019				5	X	X	X				X	
Trip Blank06	13			16/07/2019				5	X	X	X				X	

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up

Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

pH CWN.

Environmental Division
Sydney
Work Order Reference
ES1922172

Telephone : +61-2-8784 8555

APPENDIX B7: AUGUST 2019

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NEWCASTLE OFFICE

10 September 2019
Document Ref: NCA19R100879

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – August 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the August 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring for a combined period of 12 months. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The August monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 14 August 2019.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The August 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);

- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	0	0	1	1
Metals***	11	0	0	1	1
Iron (dissolved)	11	0	0	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.453	2.187	8.12	Slightly cloudy, slight sulfur odour
BH2	7.79	5.888	1.902	9.02	Silty Base, dark brown, no odour
BH3	7.57	6.027	1.543	9.03	Data logger attached, Silty material at base. No sample taken.
BH4	3.06	1.736	1.324	5.92	Slightly Cloudy brown
BH5	7.36	5.894	1.466	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.723	1.897	4.52	Slight brown colour, slight sulfur odour
BH7	2.98	1.649	1.331	4.51	Cloudy brown, sulfur odour
BH8	3.88	2.406	1.474	6.18	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.503	3.127	5.29	Cloudy light brown, sulfur odour
BH12	8.67	6.889	1.781	8.12	Slight acrylic odour. No sample taken.
MW239S	3.04	1.352	1.688	3.89	Dark Brown - Slight Sulfur odour.
MW239D	3.04	1.327	1.713	20.2	Slight Sulfur odour, no sample taken
SW01*	N/A	0.15	2.65	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry	-	N/A	Location was dry.
SW03*	N/A	0.195	1.195	N/A	Water clear, no odour.
SW04*	N/A	0.18	2.18	N/A	Clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1145	19.69	165	5.47	103
BH02	1120	19.66	136	4.7	275
BH04	1100	17.96	102	4.76	266
BH06	1330	18.32	277	4.69	140
BH07	1345	17.71	329	4.88	55
BH08	1415	18.2	374	4.66	27
BH11	1215	17.66	261	4.74	126
MW239S	1300	17.99	530	4.75	72.8
SW01	1045	9.52	1205	4.6	263
SW03	1245	11.96	464	4.67	152
SW04	0950	8.07	485	4.17	294

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
Physical and Chemical Stressors	Sodium	1	11	8	97	No	Similar
	Sulphate	1	11	2	212	No	Similar
	Chloride	1	11	16	134	No	Similar
	Fluoride	0.1	11	<0.1	0.4	No	Similar
	Reactive [3] Phosphorous	0.01	NA	NA	NA	NA	NA
	Total Phosphorous [3]	0.01	NA	NA	NA	NA	NA
	Nitrite [3]	0.01	NA	NA	NA	NA	NA
	Nitrate [3]	0.01	NA	NA	NA	NA	NA
	Ammonia [3]	0.01	NA	NA	NA	NA	NA
	Total Nitrogen [3]	0.1	NA	NA	NA	NA	NA
	Total Hardness	1	11	8.0	177	No	Similar
	Total Dissolved Solids	1	11	55	528	No	Similar
	pH	0.01	11	4.47	6.22	All above ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.035	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.005	No	Similar
	Cu	0.001	11	<0.001	0.026	5 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH4, SW1 & SW3)	Similar
	Fe	0.05	11	<0.05	7.96	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	0.004	0.482	No	Similar
	Ni	0.001	11	<0.001	0.005	No	Similar
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	<0.005	0.075	4 above ANZECC 2000 Trigger Values[2] (BH1, SW1, SW3 & SW4)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring
	$>C_{10}$-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in July than the mean leading up to the August monitoring event. August rainfall is trending towards below average rainfall.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6				
2nd	0	12.8	0	23.8	0	21.2	0	0				
3rd	0	0.4		0.6	0	0.6	0	0.2				
4th	0	0	0	0	20.8	0.4	5.2	0				
5th	0	0	0	0	0.2	25	1.8	0.2				
6th	0	0	0	0	23.2	2.6	1.2	0				
7th	5.0	0	8.2	0	0.2	1	0.6	0				
8th	0	0	0	0	0	0	1.6	0				
9th	0	6.6	0	0	0	0	0.4	0				
10th	0.2	0	12.0	2.2	0	0	0	0				
11th	0	0	0	0	0.6	0	0	0				
12th	3.0	0	0	0	0	0	0	0				
13th	0	0	0	0	1.4	0	0	0				
14th	0	0	0	0.2	0	0	0	0				
15th	0	0	0	1.4	0	0	0	0				
16th	0	0	4.8	3.6	0	0	0					
17th	0	0	59.4	1.4	0	0	0					
18th	0	0	2.6	0.2	0	17.8	0					
19th	0	0	2.2	0.2	0	0	0					
20th	2.4		0	2.0	0	0	0					
21st	1.0	1.4	0	0.2	0	0	0					
22nd	0	1.0	1.2	0.2	0	0.2	0					
23rd	0	1.4	0	0	0	20	0					
24th	0	9.2	5.4	0	0	50.6	0					
25th	0	0	5.2	0	0	15.2	2.0					
26th	0	0	0	0	0	1.8	0					
27th	0	0	0	0	0	0.8	0					
28th	1.0	0	0	0	0.8	0	0					
29th	0		0	0	0	0	0					
30th	0		38.2	0	0	0	0.6					
31st	0		6.6		0		10					
Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**10.0**				
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**72.9**	**60.4**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data for the July/August period it is expected that the current groundwater and surface water levels will remain similar compared to current levels.

5. DATA TRENDS

Attachment B provides a graphical representation of data acquired during field sampling and laboratory analysis. Parameters and analytes include; electrical conductivity (µs/cm), groundwater elevation (mAHD), and concentrations of iron, nickel and zinc (mg/L). Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances observed.

6. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

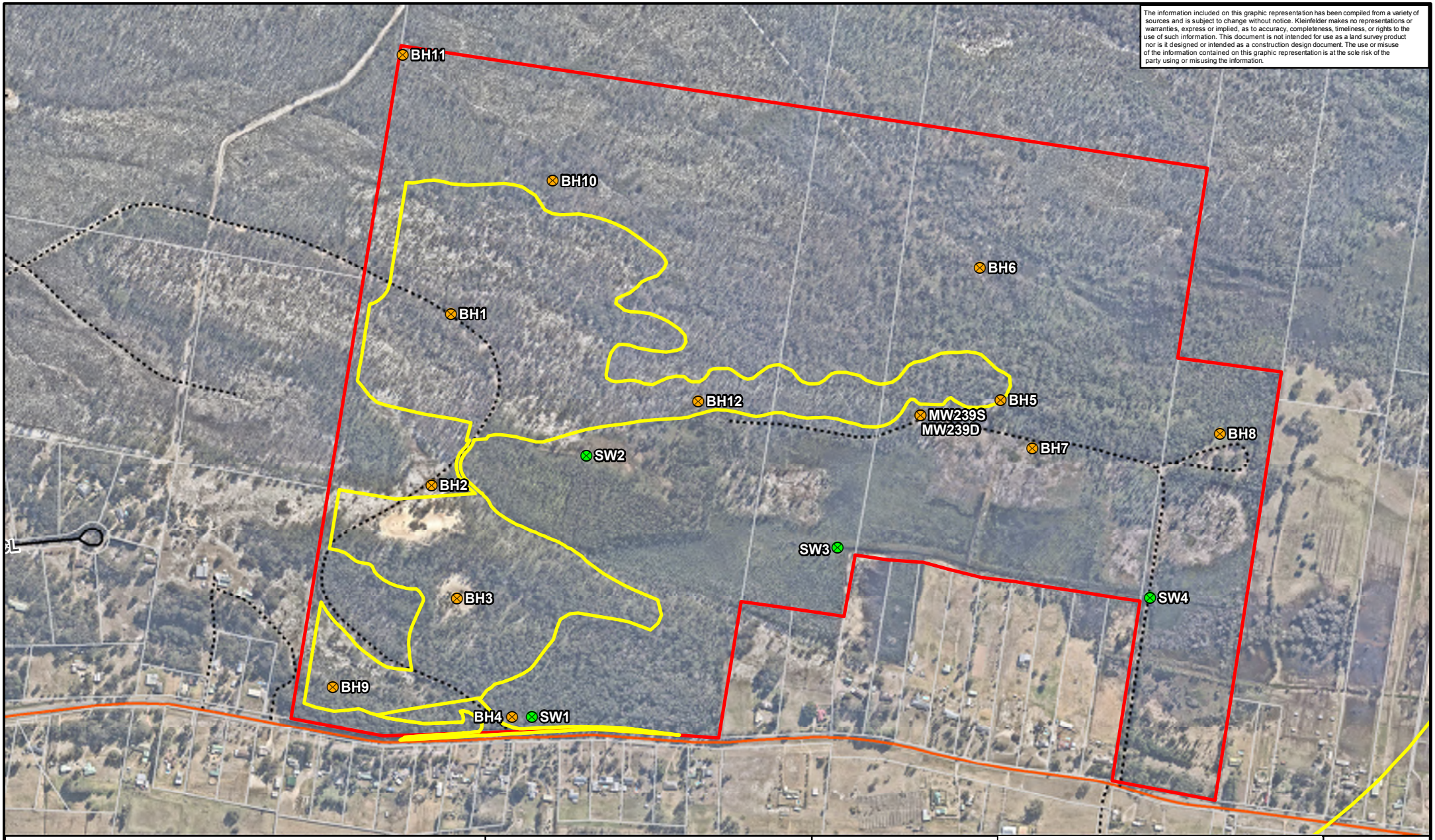
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce
DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations August 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-		350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals														
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluorosulfonyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids											Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sums of PFAS		
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorododecane sulfonic acid (PFDoS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (PFOSA)	N-Methyl-perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (NMeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56																	0.07		
HEPA NEMP 2018***						0.00023						19																			
HEPA NEMP 2018†												5.6																	0.7		
Sample Name	Sample Date																														
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	21-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
MW2395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
† Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																Alkalinity						Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*				0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	0.69	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-	-	14	0.77	< 1.0	< 1.0	14	8.0	128	83	82	6.22
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-	-	8.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	4.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	0.1	-	-	-	-	-	-	-	-	2.4	2.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	-	2.4	2.45	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-	-	-

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids										Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_19062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1925986**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 15-Aug-2019 15:57
Order number	:	Date Analysis Commenced	: 16-Aug-2019
C-O-C number	: ----	Issue Date	: 21-Aug-2019 18:02
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.22	5.20	5.01	4.87	5.53
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		128	110	85	201	232
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		82	61	49	104	168
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		83	72	55	131	151
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		181	310	30	16	44
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	11	9	17	16
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		14	<1	<1	<1	8
Total Alkalinity as CaCO3	----	1	mg/L		14	<1	<1	<1	8
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	8	5	21	15
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21	20	16	38	49
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	1	2	2	<1
Magnesium	7439-95-4	1	mg/L		2	2	1	3	4
Sodium	7440-23-5	1	mg/L		14	12	8	23	32
Potassium	7440-09-7	1	mg/L		<1	<1	1	1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.002	0.004	0.013	0.026	0.005
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.003	<0.001	<0.001	<0.001	0.002

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.012**	**0.026**	**0.001**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.008**	**0.011**	**0.018**	**0.008**	**0.023**
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.023**	<0.005	**0.007**	**0.007**	<0.005
Iron	7439-89-6	0.05	mg/L		**7.96**	**0.08**	<0.05	**2.19**	**1.54**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	**0.1**
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**0.91**	**0.73**	**0.56**	**1.51**	**1.85**
ø **Total Cations**	----	0.01	meq/L		**0.77**	**0.74**	**0.56**	**1.37**	**1.77**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**88.3**	**83.3**	**85.9**	**86.2**	**84.1**
Toluene-D8	2037-26-5	2	%		**104**	**99.0**	**102**	**104**	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-001	ES1925986-002	ES1925986-003	ES1925986-004	ES1925986-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**118**	**112**	**117**	**116**	**115**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**----**	**99.4**	**99.5**	**95.4**
13C8-PFOA	----	0.02	%		**----**	**----**	**106**	**97.2**	**94.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH8	BH11	MW239S	SW1	SW3
			Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit	ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.00**	**4.88**	**4.83**	**4.53**	**4.47**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**260**	**197**	**359**	**813**	**338**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**140**	**135**	**195**	**548**	**192**
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**169**	**128**	**233**	**528**	**220**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**98**	**303**	**363**	**5**	<5
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**12**	**12**	**29**	**177**	**44**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**4**	**4**	**11**	**212**	**54**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**63**	**47**	**88**	**134**	**56**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	**18**	**6**
Magnesium	7439-95-4	1	mg/L	**3**	**3**	**7**	**32**	**7**
Sodium	7440-23-5	1	mg/L	**42**	**28**	**54**	**97**	**38**
Potassium	7440-09-7	1	mg/L	<1	<1	<1	**4**	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	**0.09**	<0.05
Barium	7440-39-3	0.001	mg/L	**0.008**	**0.004**	**0.006**	**0.027**	**0.035**
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	**0.005**	**0.003**
Chromium	7440-47-3	0.001	mg/L	**0.001**	**0.002**	**0.002**	<0.001	<0.001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		<0.001	**0.001**	<0.001	**0.003**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.007**	**0.004**	**0.482**	**0.036**
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.001**	<0.001	**0.005**	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.005**	<0.005	**0.075**	**0.013**
Iron	7439-89-6	0.05	mg/L		**1.72**	**0.87**	**1.00**	**2.15**	**1.16**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	**0.4**	**0.1**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.86**	**1.41**	**2.71**	**8.19**	**2.70**
ø Total Cations	----	0.01	meq/L		**2.07**	**1.46**	**2.92**	**7.85**	**2.53**
ø Ionic Balance	----	0.01	%		**----**	**----**	**----**	**2.12**	**----**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**83.1**	**84.3**	**84.5**	**85.8**	**87.0**
Toluene-D8	2037-26-5	2	%		**108**	**100**	**102**	**103**	**105**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	SW1	SW3
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00	15-Aug-2019 00:00
Compound	CAS Number	LOR	Unit		ES1925986-006	ES1925986-007	ES1925986-008	ES1925986-009	ES1925986-010
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**120**	**113**	**114**	**114**	**117**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.1**	**----**	**----**	**----**	**----**
13C8-PFOA	----	0.02	%		**98.6**	**----**	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW4	RINSATE07	----	----	----
			Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1925986-011	ES1925986-012	--------	--------	--------
				Result	Result	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**4.48**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**308**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**160**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**200**	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**33**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**43**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**55**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**5**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**5**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**40**	----	----	----	----
Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.040**	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.001**	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	--------	--------	--------
					Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Copper	7440-50-8	0.001	mg/L		**0.001**	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.032**	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.009**	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.57**	<0.05	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	----	----	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**2.45**	----	----	----	----
ø **Total Cations**	----	0.01	meq/L		**2.40**	----	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	--------	--------	--------
					Result	Result	----	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	<0.02	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE07	----	----	----
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1925986-011	ES1925986-012	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		89.8	81.1	----	----	----
Toluene-D8	2037-26-5	2	%		108	95.5	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**SW4**	**RINSATE07**	**----**	**----**	**----**
				Client sampling date / time	15-Aug-2019 00:00	15-Aug-2019 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1925986-011**	**ES1925986-012**	**--------**	**--------**	**--------**
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%		**117**	**109**	**----**	**----**	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**----**	**92.4**	**----**	**----**	**----**
13C8-PFOA	----	0.02	%		**----**	**101**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1925986**	Page	: 1 of 17
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 15-Aug-2019
Order number	:	Date Analysis Commenced	: 16-Aug-2019
C-O-C number	: ----	Issue Date	: 21-Aug-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005P: pH by PC Titrator (QC Lot: 2529124)									
ES1925494-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.94	6.95	0.144	0% - 20%
ES1925986-001	BH1	EA005-P: pH Value	----	0.01	pH Unit	6.22	5.87	5.79	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2529126)									
ES1925986-005	BH7	EA005-P: pH Value	----	0.01	pH Unit	5.53	5.12	7.70	0% - 20%
ES1926052-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	5.57	5.36	3.84	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2529121)									
ES1925494-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	28900	28800	0.325	0% - 20%
ES1925986-001	BH1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	128	125	2.32	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2529125)									
ES1925986-005	BH7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	232	231	0.00	0% - 20%
ES1926052-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	7360	7370	0.123	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2533173)									
ES1925982-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	5540	5080	8.60	0% - 20%
ES1925982-011	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	2310	2390	3.21	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2533176)									
ES1925986-009	SW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	548	564	2.97	0% - 20%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2533174)									
ES1925982-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
ES1925982-011	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	8	8	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2533175)									
ES1925986-009	SW1	EA025H: Suspended Solids (SS)	----	5	mg/L	5	<5	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2529123)									
ES1925494-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2529123) - continued									
ES1925494-001	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	284	296	4.15	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	284	296	4.15	0% - 20%
ES1925986-001	BH1	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	14	10	31.9	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	14	10	31.9	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2529953)									
ES1925986-001	BH1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
ES1925986-010	SW3	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	54	54	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2529954)									
ES1925986-001	BH1	ED045G: Chloride	16887-00-6	1	mg/L	21	22	0.00	0% - 20%
ES1925986-010	SW3	ED045G: Chloride	16887-00-6	1	mg/L	56	56	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2529026)									
ES1925901-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	3	3	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1925982-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	34	34	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	78	77	1.58	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	891	872	2.23	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2529028)									
ES1925986-005	BH7	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	32	32	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ET1902477-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	159	161	1.04	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	454	459	0.964	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	118	119	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	13	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529025)									
ES1925901-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529025) - continued									
ES1925901-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.12	0.00	No Limit
ES1925982-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.117	0.116	0.877	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.14	0.13	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.05	0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529030)									
ES1925986-005	BH7	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.54	1.56	1.32	0% - 20%
ET1902477-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.510	0.502	1.46	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2529030) - continued									
ET1902477-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.136	0.135	1.13	0% - 20%
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	0.147	0.150	1.75	0% - 20%
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.006	0.004	45.8	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	2.40	2.38	0.706	0% - 20%
		EG020A-F: Copper	7440-50-8	0.001	mg/L	160	161	0.599	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	65.6	66.3	1.000	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	1.13	1.12	0.713	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	84.7	83.6	1.29	0% - 20%
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	0.30	0.30	0.00	0% - 20%
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	22.2	22.1	0.379	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2532085)									
ES1925986-012	RINSATE07	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1926125-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.046	0.036	23.6	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.106	0.110	3.53	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2532085) - continued									
ES1926125-001	Anonymous	EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	2.62	2.40	8.72	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2529027)									
ES1925901-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0001	0.00	No Limit
ES1925982-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2529029)									
ES1925986-004	BH6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ET1902477-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2532086)									
ES1926015-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1926090-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2529122)									
ES1925494-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.3	0.3	0.00	No Limit
ES1925986-001	BH1	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1925986-008	MW239S	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1925986-008	MW239S	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2529856)									
ES1925983-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1925986-008	MW239S	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2527476)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2527476)									
EP1908075-070	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2527476)									
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2527476)									
EP1908075-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1926034-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2527476)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231P: PFAS Sums (QC Lot: 2527476) - continued									
EP1908075-070	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1926034-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 2529124)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA005P: pH by PC Titrator (QCLot: 2529126)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98	102
				----	7 pH Unit	100	98	102
EA010P: Conductivity by PC Titrator (QCLot: 2529121)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 91.4	95	113
EA010P: Conductivity by PC Titrator (QCLot: 2529125)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 92.1	95	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2533173)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	90.8	87	109
				<10	293 mg/L	111	66	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2533176)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	90.3	87	109
				<10	293 mg/L	104	66	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2533174)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.3	83	129
				<5	1000 mg/L	90.8	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2533175)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83	129
				<5	1000 mg/L	97.6	82	110
ED037P: Alkalinity by PC Titrator (QCLot: 2529123)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	83.2	81	111
				----	50 mg/L	93.1	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2529953)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	82	122
				<1	500 mg/L	106	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 2529954)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	101	81	127
				<1	1000 mg/L	99.3	81	127
ED093F: Dissolved Major Cations (QCLot: 2529026)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.4	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	104	90	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 2529026) - continued								
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.6	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.3	85	113
ED093F: Dissolved Major Cations (QCLot: 2529028)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.7	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	98.7	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.1	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529025)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.0	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.7	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.3	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.9	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.8	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.8	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	90.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.0	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.3	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.6	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.4	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.6	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.9	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.2	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.0	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.6	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.2	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.7	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	91.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	93.8	85	115

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030) - continued								
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	91.4	82	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2532085)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.3	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	96.9	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.6	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	95.0	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.9	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	98.9	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	98.0	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	97.8	85	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	97.5	82	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2529027)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	84.2	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2529029)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.8	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2532086)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.8	83	105
EK040P: Fluoride by PC Titrator (QCLot: 2529122)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	102	82	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2528024)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	61.4	56	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	88.8	72	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	69.3	56	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2528024)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	63.7	58	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	72.3	63	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	77.6	62	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2529856)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2529856)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	95.3	75	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2529856)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	92.3	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	107	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	107	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	106	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	87.6	70	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2527476)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.2	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	85.6	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	88.4	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	89.6	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	85.8	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2527476)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	110	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	76.8	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	98.0	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	88.8	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	99.2	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	103	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	101	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	97.4	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	91.2	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	92.5	70	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2527476)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	79.0	70	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	77.5	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	70.3	70	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	72.8	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	98.4	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	95.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	121	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	100	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2529953)							
ES1925986-001	BH1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	119	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2529954)							
ES1925986-001	BH1	ED045G: Chloride	16887-00-6	250 mg/L	102	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529025)							
ES1925901-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	128	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	120	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	117	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	128	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	129	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	120	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	126	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	120	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	128	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	126	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	128	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	128	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030)							
ES1925986-006	BH8	EG020A-F: Arsenic	7440-38-2	1 mg/L	112	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	112	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	112	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	108	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	106	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	114	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	112	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG020F: Dissolved Metals by ICP-MS (QCLot: 2529030) - continued							
ES1925986-006	BH8	EG020A-F: Manganese	7439-96-5	1 mg/L	108	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	108	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	105	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	109	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2532085)							
ES1925998-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	116	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	111	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	117	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	111	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	112	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	116	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	112	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	110	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	# Not Determined	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	112	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	116	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	111	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2529027)							
ES1925901-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	72.9	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2529029)							
ES1925986-003	BH4	EG035F: Mercury	7439-97-6	0.01 mg/L	80.5	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2532086)							
ES1926013-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.8	70	130
EK040P: Fluoride by PC Titrator (QCLot: 2529122)							
ES1925494-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	# 62.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	110	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	112	70	130
EP080: BTEXN (QCLot: 2529856)							
ES1925983-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	93.5	70	130
		EP080: Toluene	108-88-3	25 µg/L	114	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	124	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	122	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 2529856) - continued							
ES1925983-001	Anonymous	EP080: ortho-Xylene	95-47-6	25 µg/L	128	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	111	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	90.4	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	94.8	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	98.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	102	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	98.0	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	100	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	80.9	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	76.2	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	102	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	102	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	114	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	111	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	114	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	112	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	111	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	68.4	50	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	121	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	70.1	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	89.2	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	82.8	50	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	105	50	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	114	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	99.8	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476)							
EP1908075-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	105	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	100	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	76.6	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2527476) - continued							
EP1908075-070	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	111	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1925986**	Page	: 1 of 11
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 15-Aug-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 21-Aug-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 12
Order number	:	No. of samples analysed	: 12

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA010P: Conductivity by PC Titrator	QC-MRG2-25291210	----	**Electrical Conductivity @ 25°C**	----	91.4 %	95-113%	**Recovery less than lower control limit**
EA010P: Conductivity by PC Titrator	QC-MRG2-25291250	----	**Electrical Conductivity @ 25°C**	----	92.1 %	95-113%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
EG020F: Dissolved Metals by ICP-MS	ES1925998--001	Anonymous	**Manganese**	7439-96-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK040P: Fluoride by PC Titrator	ES1925494--002	Anonymous	**Fluoride**	16984-48-8	62.0 %	70-130%	**Recovery less than lower data quality objective**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	----	----	----	16-Aug-2019	15-Aug-2019	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	15-Aug-2019	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**20-Aug-2019**	22-Aug-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**20-Aug-2019**	22-Aug-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	29-Aug-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	11-Feb-2020	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
RINSATE07	**15-Aug-2019**	**----**	----	----	**19-Aug-2019**	11-Feb-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**19-Aug-2019**	12-Sep-2019	✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
RINSATE07	**15-Aug-2019**	**----**	----	----	**20-Aug-2019**	12-Sep-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4	**15-Aug-2019**	**----**	----	----	**16-Aug-2019**	12-Sep-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4, RINSATE07	**15-Aug-2019**	**19-Aug-2019**	22-Aug-2019	✓	**21-Aug-2019**	28-Sep-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4, RINSATE07	**15-Aug-2019**	**19-Aug-2019**	22-Aug-2019	✓	**21-Aug-2019**	28-Sep-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4, RINSATE07	**15-Aug-2019**	**19-Aug-2019**	29-Aug-2019	✓	**19-Aug-2019**	29-Aug-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4, RINSATE07	**15-Aug-2019**	**19-Aug-2019**	29-Aug-2019	✓	**19-Aug-2019**	29-Aug-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, BH2, BH4, BH6, BH7, BH8, BH11, MW239S, SW1, SW3, SW4, RINSATE07	**15-Aug-2019**	**19-Aug-2019**	29-Aug-2019	✓	**19-Aug-2019**	29-Aug-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE07	**15-Aug-2019**	**16-Aug-2019**	11-Feb-2020	✓	**16-Aug-2019**	11-Feb-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE07	**15-Aug-2019**	**16-Aug-2019**	11-Feb-2020	✓	**16-Aug-2019**	11-Feb-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE07	**15-Aug-2019**	**16-Aug-2019**	11-Feb-2020	✓	**16-Aug-2019**	11-Feb-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE07	**15-Aug-2019**	**16-Aug-2019**	11-Feb-2020	✓	**16-Aug-2019**	11-Feb-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH4, BH6, BH7, BH8, RINSATE07	**15-Aug-2019**	**16-Aug-2019**	11-Feb-2020	✓	**16-Aug-2019**	11-Feb-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	6	52	**11.54**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	6	54	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	29	**10.34**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	**5.77**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	29	**13.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	29	**13.79**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	**5.77**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	29	**6.90**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	3	52	**5.77**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	54	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

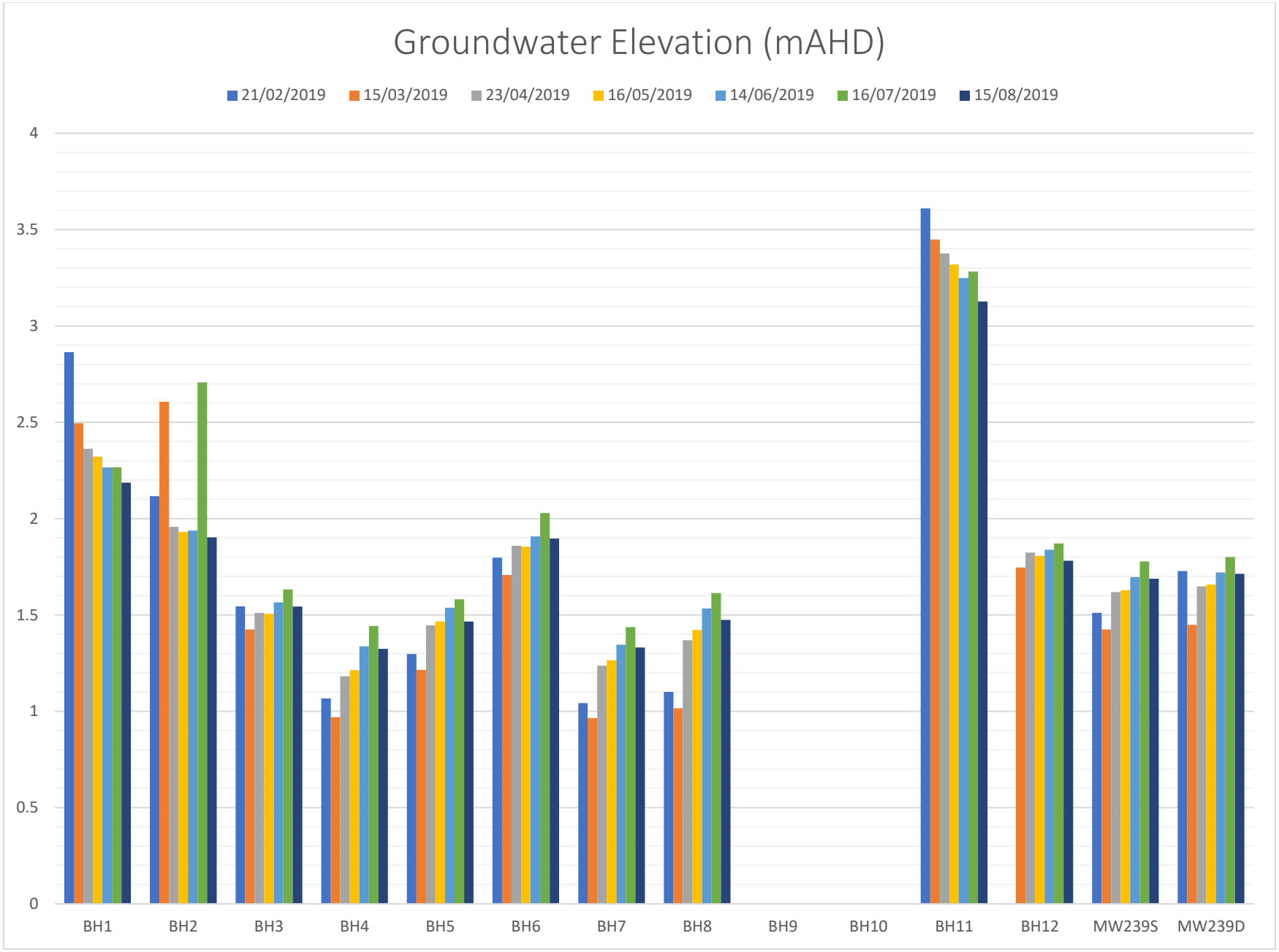
The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

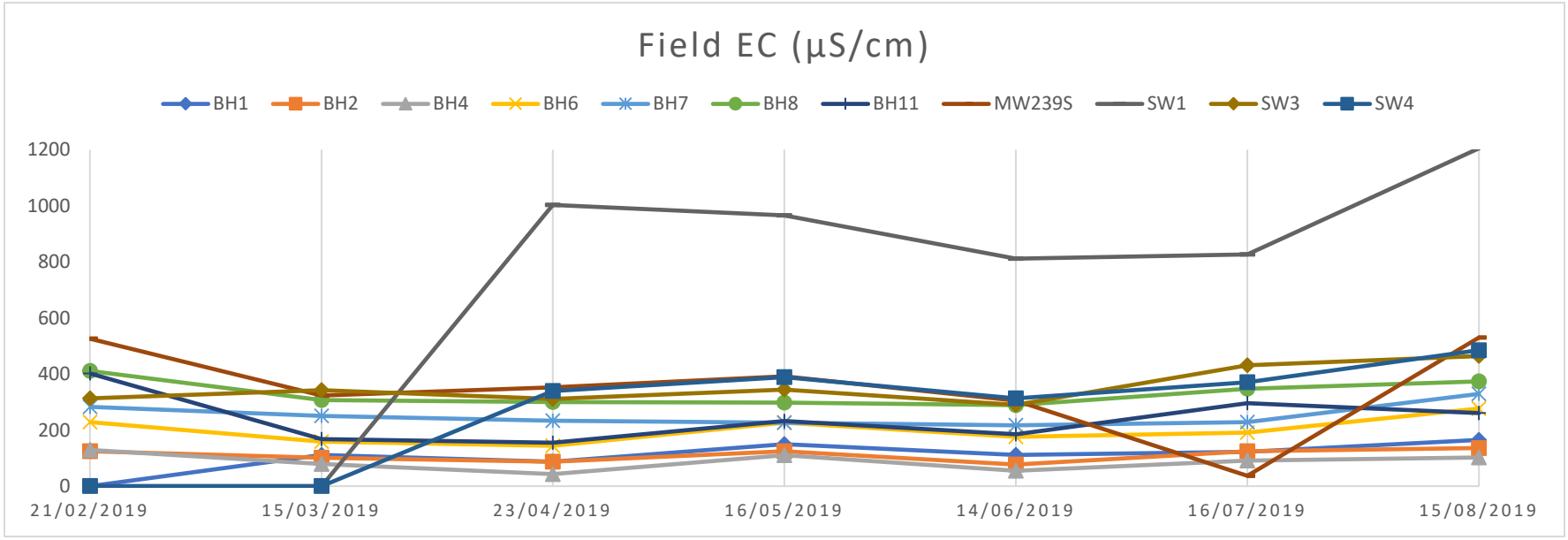
Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

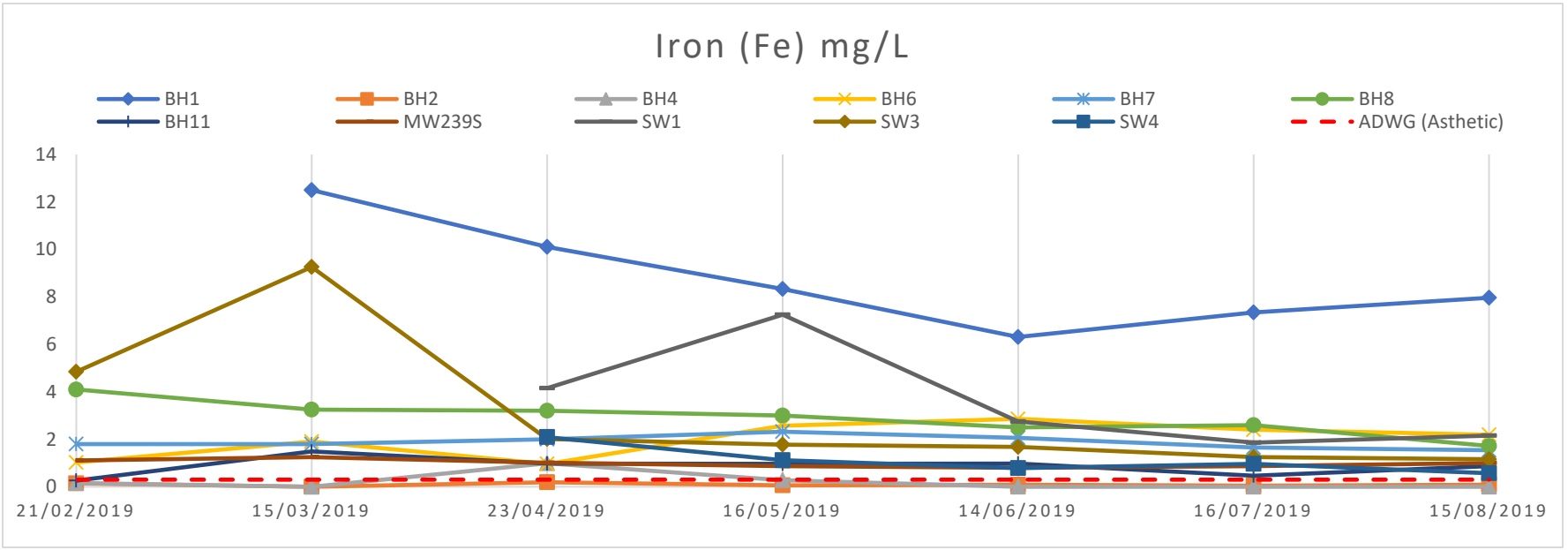
Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

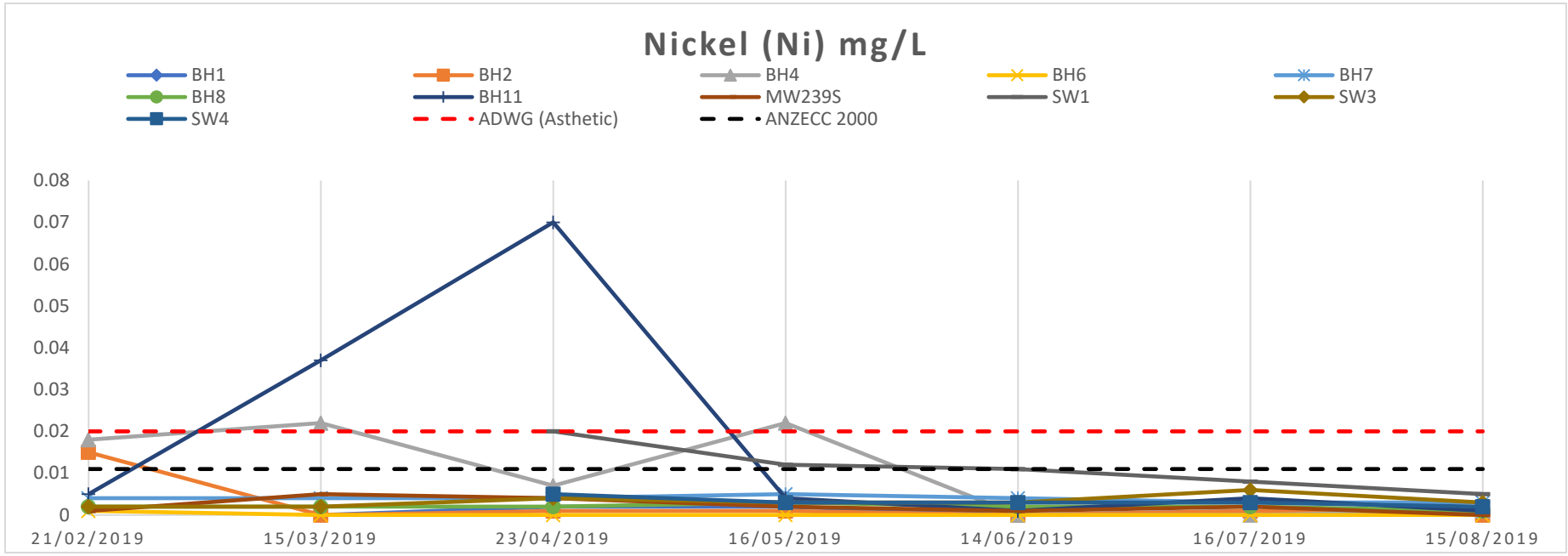
Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

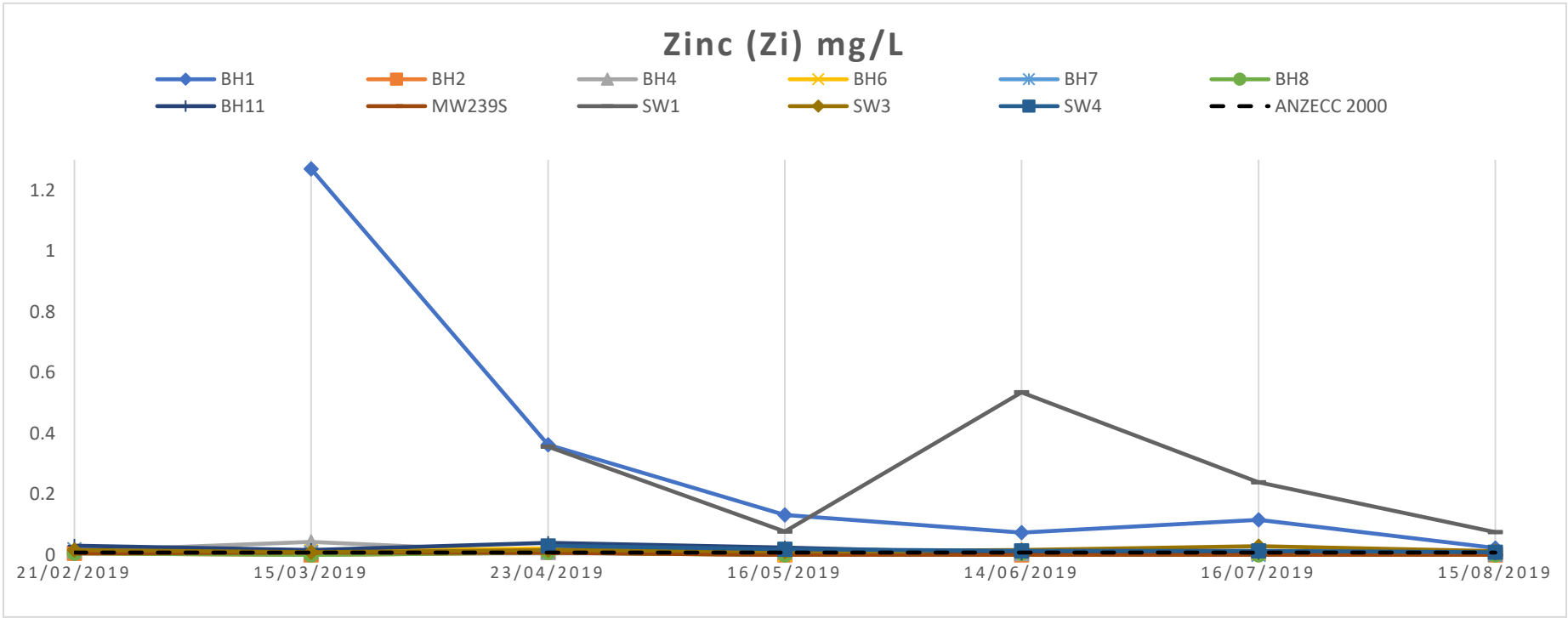
ATTACHMENT B: DATA TRENDS

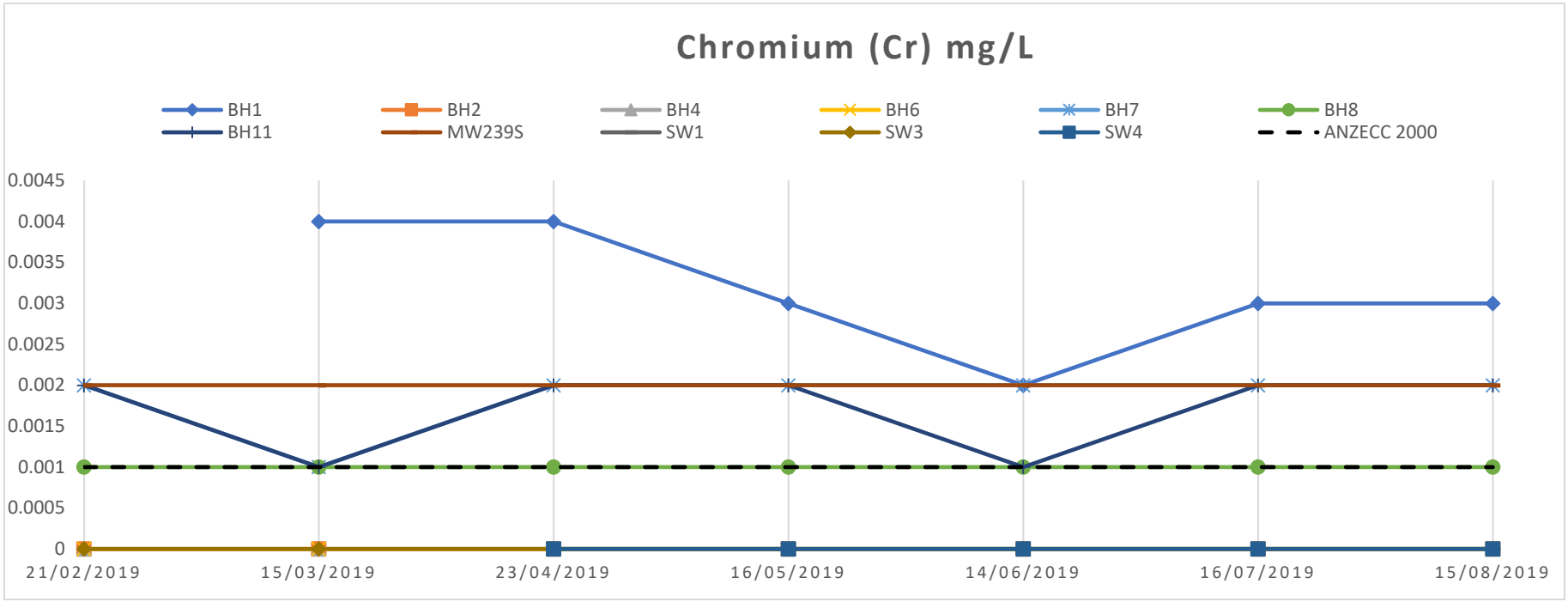

Groundwater Elevation (mAHD)
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
4
3.5
3
2.5
2
1.5
1
0.5
0
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
MW239S
MW239D

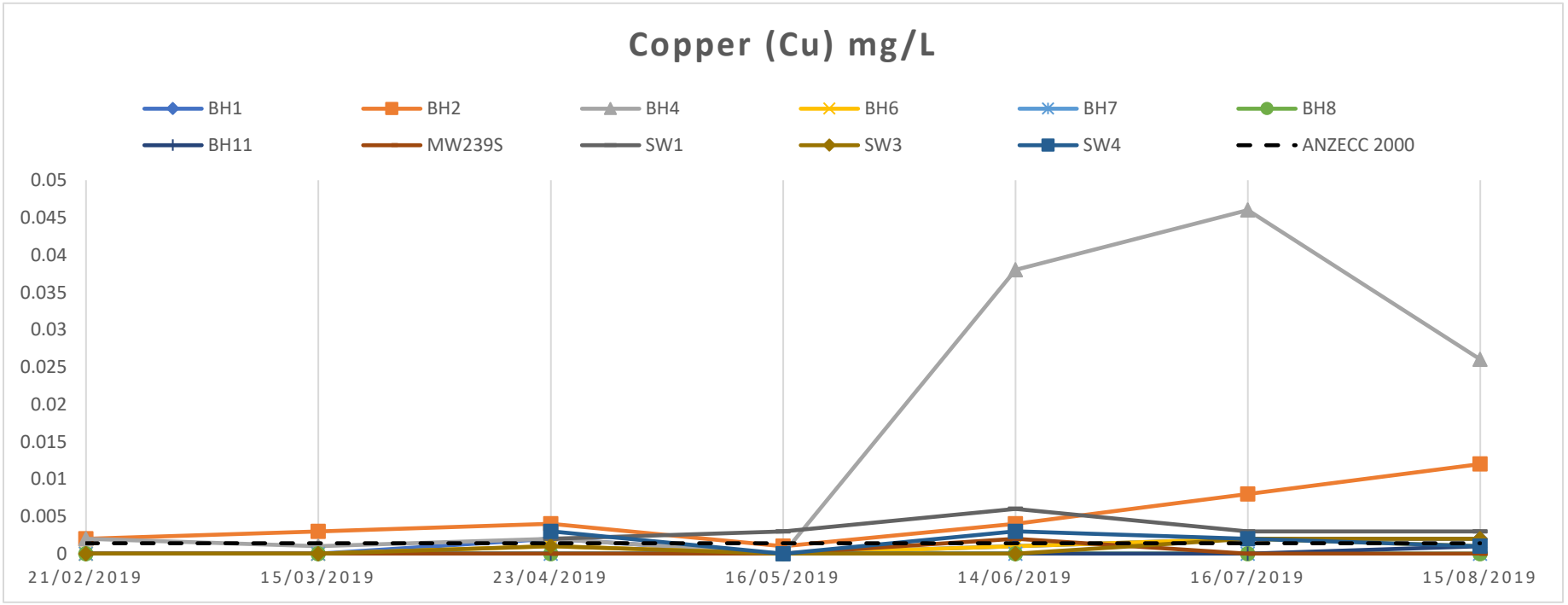

Field EC (µS/cm)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019

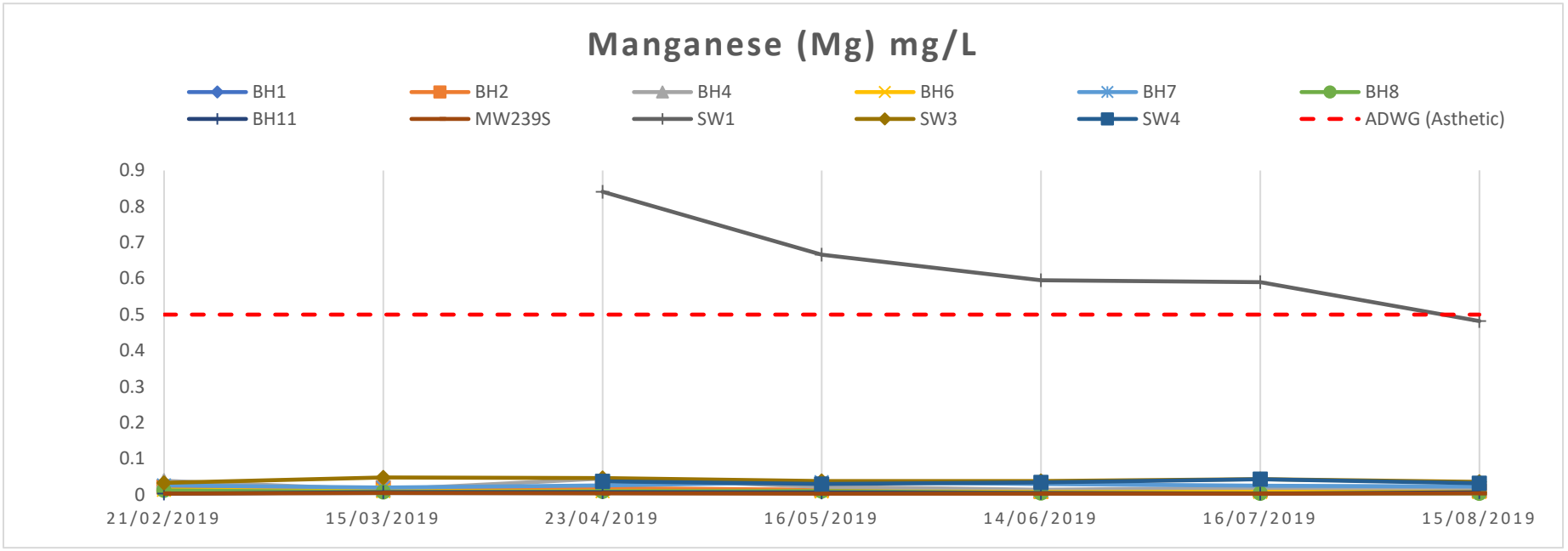

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8
6
4
2
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019


Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019


Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1
0.8
0.6
0.4
0.2
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019


Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019


Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019


Manganese (Mg) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019

APPENDIX B8: SEPTEMBER 2019

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NEWCASTLE OFFICE

19 September 2019
Document Ref: NCA19R101344

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry – September 2019 monitoring

Please find enclosed the Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry for the September 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring and also included additional monitoring as part of the quarterly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The September monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) including additional analytical parameters and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 16 September 2019. Additional sampling for PFAS took place on 25 September 2019 following an irregular detection of PFAS at BH4 and SW4. A summary of these results are presented in **Table 3.4**

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following the gauging each of the HydraSleeves were removed and samples taken.

The September 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 14 wells);
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Extended Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	7	1	1	1	1

* Extended Water Suite B: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Hardness & TDS (Calc'), Nitrite, Nitrate, Ammonia, Reactive Phosphorus, Total Phosphorus, Total Nitrogen, TKN
** TRH (C6 – C40), BTEXN (Silica Gel)
*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.428	2.212	8.28	Slightly cloudy brown, no odour
BH2	7.79	5.796	1.994	9.08	Dark brown, slight sulfur odour
BH3					Well Decommissioned
BH4	3.06	1.604	1.456	6.11	Clear, no odour
BH5	7.36	5.786	1.574	8.71	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.647	1.973	4.62	Clear, slight odour
BH7	2.98	1.542	1.438	4.61	Light brown, sulfur odour
BH8	3.88	2.282	1.598	6.27	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.546	3.084	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.827	1.843	8.2	No sample taken.
MW239S	3.04	1.269	1.771	3.89	Cloudy Brown, Sulfur odour.
MW239D	3.04	1.248	1.792	20.2	Slight Sulfur odour, no sample taken
SW01*	N/A	0.26	2.76	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.24	1.24	N/A	Water clear, no odour.
SW04*	N/A	0.29	2.29	N/A	Clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1130	21.02	125	5.43	101
BH02	1100	21.61	111	4.7	263
BH04	1245	20.53	96	4.27	251
BH06	1515	18.66	215	4.61	57
BH07	1415	18.34	232	4.73	-22
BH08	1330	18.64	300	4.72	-10
BH11	1200	20.26	195	4.64	31.2
MW239S	1430	17.56	397	4.61	-11
SW01	1300	16.59	1138	4.21	323
SW03	1445	17.05	449	5.02	86.7
SW04	1030	14.8	371	4.19	360

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the Tables Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of data acquired during field sampling and laboratory analysis. Parameters and analytes include; electrical conductivity (µs/cm), groundwater elevation (mAHD), and concentrations of iron, nickel and zinc (mg/L). Where

relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances observed.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Appendix B)
Physical and Chemical Stressors	Sodium	1	11	11	117	No	Similar
	Sulphate	1	11	2	244	No	Similar
	Chloride	1	11	18	193	No	Similar
	Fluoride	0.1	11	<0.1	0.7	No	Similar
	Reactive [3] Phosphorous	0.01	11	<0.01	<0.01	No	Similar
	Total Phosphorous [3]	0.01	11	<0.01	0.43	9 above ANZECC 2000 Trigger range[1]	Mostly similar across all sample locations with a notable reduction at BH8
	Nitrite [3]	0.01	11	<0.01	<0.01	No	Similar
	Nitrate [3]	0.01	11	<0.01	1.07	1 above ANZECC 2000 Trigger range[1]	Similar
	Ammonia [3]	0.01	11	<0.01	0.2	No	Similar
	Total Nitrogen [3]	0.1	11	0.1	2.7	8 above ANZECC 2000 Trigger range[1] (BH2, BH4, BH6, BH7, BH8, BH11, MW239S & SW1)	Mostly similar across all sample locations with a slight increase present at BH2 compared to previous round.
	Total Hardness	1	11	8.0	213	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	Total Dissolved Solids	1	11	55	528	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	pH	0.01	11	4.3	5.44	All outside ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	0.001	No	Similar
	B	0.05	11	<0.005	0.09	No	Similar
	Ba	0.001	11	0.002	0.056	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Appendix B)
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	0.0002	No	Similar
	Cr	0.005-0.1	11	<0.001	0.004	4 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH8 & MW239S)	Similar
	Co	0.001	11	<0.001	0.008	No	Similar
	Cu	0.001	11	<0.001	0.051	8 above ANZECC 2000 Trigger Values[2] (BH2, BH4, BH6, BH7, MW238S, SW1, SW3 & SW4)	Notable increases in copper observed at BH4, BH6, BH7, SW1, SW3 and SW4
	Fe	0.05	11	0.19	8.84	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Similar
	Mn	0.001	11	0.005	0.587	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	Ni	0.001	11	<0.001	0.02	4 above ANZECC 2000 Triger Values[2] (BH7, SW1, SW3 & SW4)	Increase of Nickel across most sample locations with the exception of BH1, BH2, BH8 and BH11 showing similar results to previous sample events.
	Pb	0.005-0.1	11	<0.001	0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	<0.005	0.282	8 above ANZECC 2000 Trigger Values[2] (BH1, SW1, SW3 & SW4)	Slight increase of Zinc
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Appendix B)
	>C_{16}-C_{34}	0.1	11	<0.1	0.14	No	Similar
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	0.14	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	0.00003 (0.00005)	No	It is noted that an irregular detection of PFOS was identified at SW4. Follow up sampling (25/9/19) resulted in increased values of 0.00005
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	0.00003 (0.00005)	No	It is noted that an irregular detection of PFOS was identified at SW4. Follow up sampling (25/9/19) resulted in increased values of 0.00005

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Appendix B)
	PFDS	0.00001-0.0001	7	<0.00001	0.00002	No	It is noted that an irregular detection of PFDS was identified at BH4. Follow up sampling (25/9/19) resulted in a non-detect.

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in August than the mean leading up to the September monitoring event. September rainfall is trending towards above average rainfall. An additional 63.4mm of rainfall was recorded in the period between the initial September sampling event (16 September 2019) and the additional PFAS sampling (25 September 2019).

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4			
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2			
3rd	0	0.4		0.6	0	0.6	0	0.2	0			
4th	0	0	0	0	20.8	0.4	5.2	0	0			
5th	0	0	0	0	0.2	25	1.8	0.2	0			
6th	0	0	0	0	23.2	2.6	1.2	0	0			
7th	5.0	0	8.2	0	0.2	1	0.6	0	1			
8th	0	0	0	0	0	0	1.6	0	0			
9th	0	6.6	0	0	0	0	0.4	0	0			
10th	0.2	0	12.0	2.2	0	0	0	0	0.6			
11th	0	0	0	0	0.6	0	0	0	2.8			
12th	3.0	0	0	0	0	0	0	0	0			
13th	0	0	0	0	1.4	0	0	0	0			
14th	0	0	0	0.2	0	0	0	0	0			
15th	0	0	0	1.4	0	0	0	0	0			
16th	0	0	4.8	3.6	0	0	0	0	0			
17th	0	0	59.4	1.4	0	0	0	0	16.8			
18th	0	0	2.6	0.2	0	17.8	0	0	39.4			
19th	0	0	2.2	0.2	0	0	0	0	7.2			
20th	2.4		0	2.0	0	0	0	0	0			
21st	1.0	1.4	0	0.2	0	0	0	0	0			
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0			
23rd	0	1.4	0	0	0	20	0	0				
24th	0	9.2	5.4	0	0	50.6	0	0	0			
25th	0	0	5.2	0	0	15.2	2.0	0	0			
26th	0	0	0	0	0	1.8	0	0				
27th	0	0	0	0	0	0.8	0	0				
28th	1.0	0	0	0	0.8	0	0	0				
29th	0		0	0	0	0	0	0				
30th	0		38.2	0	0	0	0.6	21.2				
31st	0		6.6		0		10	67.4				

Monthly Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**98.6**	**75.4**			
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**73.2**	**60.6**	**73.9**	**82.3**	**78.6**

Based on the long-term rainfall data for the August/September period it is expected that the current groundwater and surface water levels will slightly elevated compared to current levels.
Data Trends

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

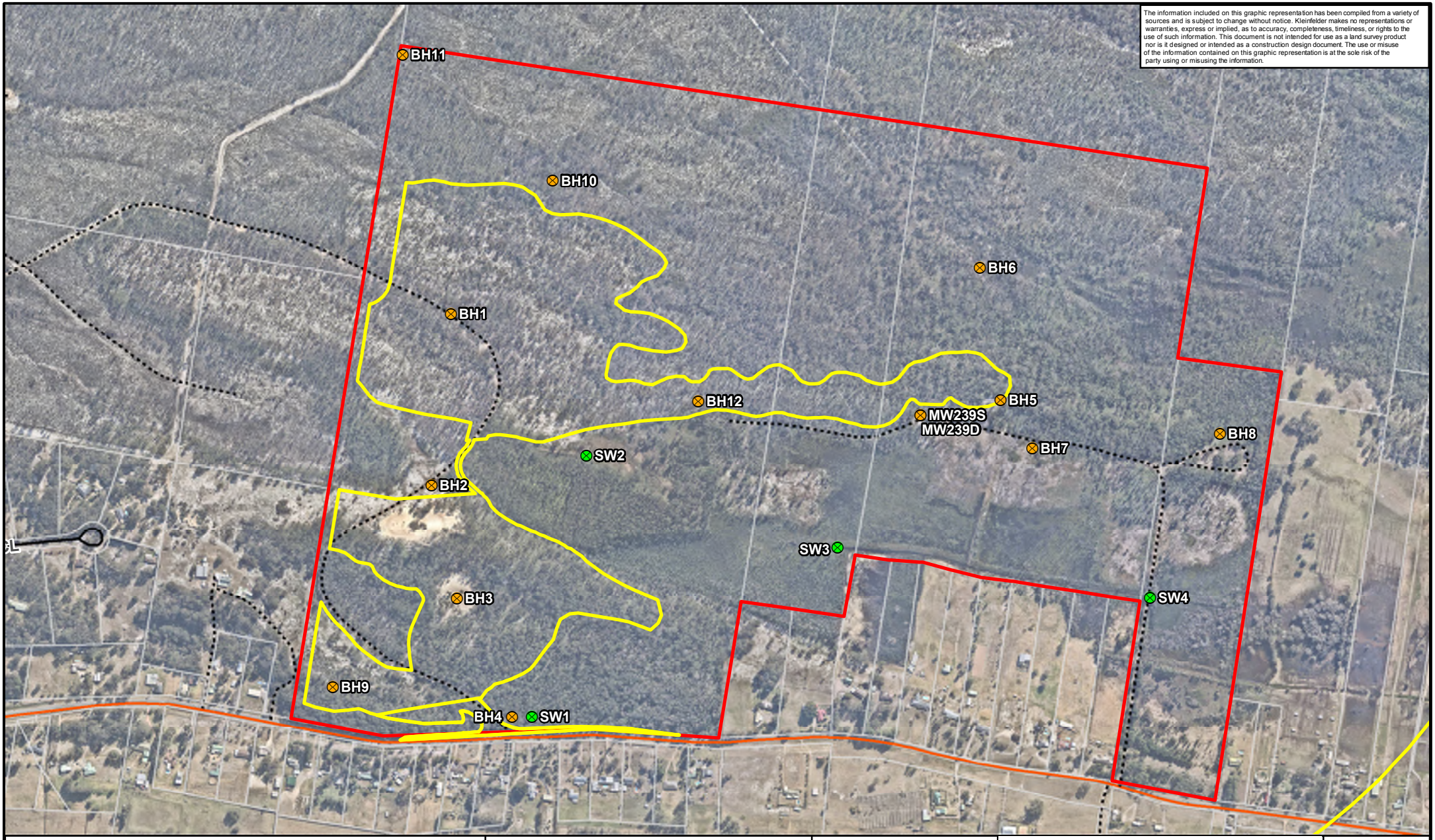
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations September 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	$C_6 - C_9$	$C_{10}-C_{14}$ - Silica Cleanup	$C_{15}-C_{28}$ - Silica Cleanup	$C_{29}-C_{36}$ - Silica Cleanup	$C_{10}-C_{36}$ Sum - Silica Cleanup	$C_6 - C_{10}$	$C_6 - C_{10}$ minus BTEX (F1)	$>C_{10}-C_{16}$ - Silica Cleanup	F2 - Silica Cleanup	$>C_{16}-C_{34}$ - Silica Cleanup	$>C_{34}-C_{40}$ - Silica Cleanup	$>C_{10}-C_{40}$ - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	< 50	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20	< 100	< 100	**140**	< 100	**140**
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals														
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
'*' denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamstown Sand Syndicate

Analyte		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorododecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56																		0.07		
HEPA NEMP 2018***						0.00023						19																				
HEPA NEMP 2018¶												5.6																		0.7		
Sample Name	Sample Date																															
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
FB22395	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03 ***	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.03 ***	**0.01**	**0.01**
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.05**	**0.05**	**0.05**

Notes:
-- Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
¶ Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations															Alkalinity							Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	%	0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*				0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5<8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-	-	14	< 1.0	< 1.0	14	8.0	128	83	82	6.22
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-	1.84	8.0	< 1.0	< 1.0	8.0	8.0	102	66	88	5.44
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	96	62	60	4.72
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	1.0	5.0	18	< 0.1	-	-	-	-	-	-	2.0	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	10	1.0	1.0	1.0	4.0	18	< 0.1	-	-	-	-	-	-	6.0	-	0.59	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	95	62	58	4.83
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	2.0	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-	-	<1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-	2.44	2.0	< 1.0	< 1.0	2.0	20	197	128	124	4.68
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
	16-Jul-19	36	< 1.0	5.0	2.0	12	66	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-	-	8.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-	2.79	5.0	< 1.0	< 1.0	5.0	16	222	144	181	5.07
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	4.0	1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06	-	5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	12	195	127	140	4.66
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69	-	4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	566	4.42
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	5.38	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61	-	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	-	2.4	2.45	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
	16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57	-	3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocarbons - Silicia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silicia Clean up				
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{16}-C_{40} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																											
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-	-	-	< 20	< 20					-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC					NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-	-	-
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200	800	< 50	< 100	< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluorosulfonyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids												Perfluoroalkyl Sulfonamides						(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																													
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH9_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_190319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0%	0%	0%
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.03	< 0.05	< 0.01	< 0.01	< 0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**100%**	**86%**	**133%**
TRIP BLANK 09_19101968	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 09_191969	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1929844**	Page	: 1 of 18
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Sep-2019 16:29
Order number	: ----	Date Analysis Commenced	: 17-Sep-2019
C-O-C number	: ----	Issue Date	: 23-Sep-2019 18:52
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X: PFAS results for sample #6, #11 confirmed by re-extraction and re-analysis
- TDS by method EA-015 may bias high for sample 9 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH7	BH6	BH8	MW239S	SW3
			Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	**5.07**	**4.68**	**4.85**	**4.66**	**4.30**
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**2.79**	**2.44**	**5.43**	**4.70**	**2.57**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**222**	**197**	**293**	**373**	**374**
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**181**	**124**	**206**	**224**	**201**
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**144**	**128**	**190**	**242**	**243**
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**44**	**71**	**79**	**179**	**7**
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**16**	**20**	**12**	**25**	**50**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**5**	**2**	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	**5**	**2**	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**13**	**21**	**4**	**14**	**48**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**53**	**38**	**70**	**85**	**57**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	**3**	<1	<1	**7**
Magnesium	7439-95-4	1	mg/L	**4**	**3**	**3**	**6**	**8**
Sodium	7440-23-5	1	mg/L	**27**	**25**	**46**	**55**	**42**
Potassium	7440-09-7	1	mg/L	**1**	**1**	<1	**1**	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	**0.001**	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	**0.06**	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	**0.016**	**0.034**	**0.010**	**0.010**	**0.045**
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	**0.004**
Chromium	7440-47-3	0.001	mg/L		**0.002**	<0.001	**0.002**	**0.002**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.007**	**0.008**	<0.001	**0.002**	**0.020**
Manganese	7439-96-5	0.001	mg/L		**0.024**	**0.012**	**0.005**	**0.006**	**0.036**
Nickel	7440-02-0	0.001	mg/L		**0.020**	**0.007**	**0.002**	**0.006**	**0.017**
Lead	7439-92-1	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.085**	**0.035**	<0.005	**0.032**	**0.094**
Iron	7439-89-6	0.05	mg/L		**1.42**	**2.08**	**2.06**	**0.94**	**0.69**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	**0.1**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.20**	**0.19**	**0.13**	**0.10**	**0.01**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.06**	**0.07**	<0.01	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.06**	**0.07**	<0.01	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.1**	**0.7**	**1.1**	**1.4**	**0.1**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.2**	**0.8**	**1.1**	**1.4**	**0.1**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.09**	**0.15**	**0.43**	**0.32**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.86**	**1.55**	**2.06**	**2.69**	**2.61**
ø Total Cations	----	0.01	meq/L		**1.53**	**1.51**	**2.25**	**2.91**	**2.83**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH7	BH6	BH8	MW239S	SW3
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-001	ES1929844-002	ES1929844-003	ES1929844-004	ES1929844-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		111	107	108	110	111
Toluene-D8	2037-26-5	2	%		119	101	114	114	98.9
4-Bromofluorobenzene	460-00-4	2	%		118	102	115	113	101
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		108	100	100	----	100
13C8-PFOA	----	0.02	%		103	106	100	----	88.9

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
			Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
				Result	Result	Result	Result	Result
EA005: pH								
pH Value	----	0.01	pH Unit	4.47	----	----	5.44	4.83
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	4.35	----	----	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	3.01	----	----	1.84	1.32
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	360	----	----	102	95
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	208	----	----	88	58
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	234	----	----	66	62
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	108	49
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	42	----	----	8	13
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	8	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	----	----	8	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	45	----	----	2	8
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	58	----	----	20	19
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	7	----	----	<1	2
Magnesium	7439-95-4	1	mg/L	6	----	----	2	2
Sodium	7440-23-5	1	mg/L	45	----	----	13	11
Potassium	7440-09-7	1	mg/L	<1	----	----	<1	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L	0.046	<0.001	<0.001	0.002	0.012

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.004**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.020**	<0.001	<0.001	**0.001**	**0.051**
Manganese	7439-96-5	0.001	mg/L		**0.039**	<0.001	<0.001	**0.009**	**0.026**
Nickel	7440-02-0	0.001	mg/L		**0.017**	<0.001	<0.001	<0.001	**0.002**
Lead	7439-92-1	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.085**	<0.005	<0.005	**0.034**	**0.005**
Iron	7439-89-6	0.05	mg/L		**0.70**	<0.05	<0.05	**8.84**	**0.19**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	----	----	<0.1	<0.1
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		<0.01	----	----	**0.12**	**0.02**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	----	----	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	----	----	<0.01	**0.24**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	----	----	<0.01	**0.24**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.1**	----	----	**0.3**	**0.4**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.1**	----	----	**0.3**	**0.6**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	----	----	**0.06**	**0.40**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	----	----	<0.01	<0.01
EN055: Ionic Balance									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
ø **Total Anions**	----	0.01	meq/L		**2.57**	----	----	**0.76**	**0.70**
ø **Total Cations**	----	0.01	meq/L		**2.80**	----	----	**0.73**	**0.74**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	**130**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	**130**
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**140**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**140**
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	----	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	**0.02**
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	RINSATE 08	TRIP BLANK 08	BH1	BH4
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		ES1929844-006	ES1929844-007	ES1929844-008	ES1929844-009	ES1929844-010
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	<0.01	<0.01	----	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	<0.01	----	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	<0.01	<0.01	----	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**110**	**107**	**106**	**110**	**108**
Toluene-D8	2037-26-5	2	%		**99.2**	**101**	**100**	**98.3**	**99.1**
4-Bromofluorobenzene	460-00-4	2	%		**100**	**103**	**100**	**99.3**	**99.3**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**93.5**	**97.3**	**98.8**	----	**96.3**
13C8-PFOA	----	0.02	%		**93.5**	**92.3**	**93.2**	----	**89.5**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	DUP08	SW1	BH11	BH2	----
			Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit	ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	--------
				Result	Result	Result	Result	----
EA005: pH								
pH Value	----	0.01	pH Unit	----	4.32	4.66	4.72	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	----	3.49	3.18	1.32	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	1080	195	96	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	----	689	140	60	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	----	702	127	62	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	----	15	533	216	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	----	213	12	13	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	<1	<1	<1	----
Total Alkalinity as CaCO3	----	1	mg/L	----	<1	<1	<1	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	244	5	8	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	----	193	46	18	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	----	21	<1	2	----
Magnesium	7439-95-4	1	mg/L	----	39	3	2	----
Sodium	7440-23-5	1	mg/L	----	117	27	11	----
Potassium	7440-09-7	1	mg/L	----	4	<1	<1	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L	<0.05	0.09	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L	0.041	0.056	0.005	0.004	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0002	<0.0001	<0.0001	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Cobalt	7440-48-4	0.001	mg/L		**0.002**	**0.008**	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	**0.001**	**0.001**	<0.001	----
Copper	7440-50-8	0.001	mg/L		<0.001	**0.012**	<0.001	**0.008**	----
Manganese	7439-96-5	0.001	mg/L		**0.036**	**0.587**	**0.008**	**0.014**	----
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.014**	**0.002**	**0.001**	----
Lead	7439-92-1	0.001	mg/L		<0.001	**0.001**	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		**0.012**	**0.282**	**0.012**	**0.007**	----
Iron	7439-89-6	0.05	mg/L		**0.76**	**2.45**	**0.79**	**0.26**	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		----	**0.7**	<0.1	<0.1	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		----	<0.01	**0.15**	**0.04**	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		----	<0.01	<0.01	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		----	**0.02**	<0.01	**1.07**	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		----	**0.02**	<0.01	**1.07**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		----	**1.2**	**0.7**	**1.6**	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		----	**1.2**	**0.7**	**2.7**	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		----	**0.05**	**0.12**	**0.28**	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		----	<0.01	<0.01	<0.01	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		----	**10.5**	**1.40**	**0.67**	----
ø Total Cations	----	0.01	meq/L		----	**9.45**	**1.42**	**0.74**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	--------
					Result	Result	Result	Result	----
EN055: Ionic Balance - Continued									
ø **Ionic Balance**	----	0.01	%		**----**	**5.38**	**----**	**----**	**----**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	**----**
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	**----**
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	**----**
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	**----**
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	**----**
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	**----**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	**----**
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	**----**
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	**----**
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	**----**
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	**----**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	**----**	**----**	**----**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	**----**	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.01**	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP08	SW1	BH11	BH2	----
				Client sampling date / time	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	16-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1929844-011	ES1929844-012	ES1929844-013	ES1929844-014	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.01**	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.01**	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.01**	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**106**	**106**	**116**	**102**	----
Toluene-D8	2037-26-5	2	%		**96.3**	**96.2**	**108**	**94.9**	----
4-Bromofluorobenzene	460-00-4	2	%		**97.5**	**99.2**	**103**	**97.8**	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.7**	**96.4**	----	----	----
13C8-PFOA	----	0.02	%		**93.3**	**84.7**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1929844**	Page	: 1 of 16
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Sep-2019
Order number	: ----	Date Analysis Commenced	: 17-Sep-2019
C-O-C number	: ----	Issue Date	: 23-Sep-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19		
No. of samples received	: 14		
No. of samples analysed	: 14		

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Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Neil Martin	Team Leader - Chemistry	Chemistry, Newcastle West, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 2587556)									
ES1929844-001	BH7	EA005: pH Value	----	0.01	pH Unit	5.07	4.94	2.60	0% - 20%
ES1929802-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	5.52	5.53	0.181	0% - 20%
EA005: pH (QC Lot: 2587557)									
ES1929855-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.69	7.80	1.42	0% - 20%
WN1906820-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	5.02	4.99	0.599	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2588437)									
ES1929801-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.89	6.99	1.44	0% - 20%
ES1929844-006	SW4	EA005-P: pH Value	----	0.01	pH Unit	4.35	4.39	0.915	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2588439)									
ES1929844-012	SW1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1080	1080	0.0931	0% - 20%
ES1929844-006	SW4	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	360	361	0.286	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2590822)									
ES1929551-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	7790	7390	5.32	0% - 20%
ES1929819-004	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	151	155	2.62	0% - 50%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 2590824)									
ES1929844-006	SW4	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	208	217	4.24	0% - 20%
EW1904011-006	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	122	126	3.42	0% - 50%
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2590821)									
ES1929551-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	6	5	26.1	No Limit
ES1929819-004	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2590823)									
ES1929844-006	SW4	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EW1904011-006	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 2588435)									
ES1929801-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	45	47	3.92	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	45	47	3.92	0% - 20%
ES1929844-006	SW4	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2588694)									
ES1929844-001	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	13	0.00	0% - 50%
ES1929844-013	BH11	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5	5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2588697)									
ES1929844-001	BH7	ED045G: Chloride	16887-00-6	1	mg/L	53	53	0.00	0% - 20%
ES1929844-013	BH11	ED045G: Chloride	16887-00-6	1	mg/L	46	46	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2589435)									
ES1929844-014	BH2	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	11	11	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES1929844-003	BH8	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	46	46	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589432)									
ES1929827-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.015	0.018	14.5	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.012	0.011	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	4.21	4.56	8.00	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589432) - continued									
ES1929827-012	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.055	0.056	2.42	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.038	0.037	3.78	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.19	0.20	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589437)									
ES1929844-014	BH2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.008	0.009	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	24.7	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.26	0.25	0.00	No Limit
ES1929844-003	BH8	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.010	0.010	0.00	0% - 50%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.005	0.005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2589437) - continued									
ES1929844-003	BH8	EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	2.06	2.10	2.07	0% - 20%
EG035F: Dissolved Mercury by FIMS (QC Lot: 2589433)									
ES1929827-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0002	0.00	No Limit
ES1929827-011	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2589436)									
ES1929844-004	MW239S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1929844-012	SW1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2588436)									
ES1929801-003	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.3	0.00	No Limit
ES1929844-006	SW4	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	0.1	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2588661)									
ES1929664-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.04	0.04	0.00	No Limit
ES1929801-012	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.01	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 2588662)									
EW1904011-006	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-010	BH4	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	0.05	65.5	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 2588696)									
ES1929844-001	BH7	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-013	BH11	EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2588660)									
ES1929631-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.80	0.70	13.6	0% - 20%
ES1929801-012	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2588663)									
EW1904011-006	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.01	0.03	63.4	No Limit
ES1929844-010	BH4	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.24	0.24	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2588656)									
ES1929631-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.2	6.0	2.23	0% - 20%
ES1929801-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2588659)									
ES1929844-004	MW239S	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.4	1.3	0.00	No Limit
EW1904011-003	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588657)									
ES1929631-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588657) - continued									
ES1929801-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.03	89.5	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2588658)									
ES1929844-004	MW239S	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.32	0.27	17.9	0% - 50%
EW1904011-003	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 2588695)									
ES1929844-001	BH7	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
ES1929844-013	BH11	EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2591332)									
ES1929844-002	BH6	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1929844-007	RINSATE 08	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.46	3.46	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.06	1.07	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.07	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2586805) - continued									
ES1929844-008	TRIP BLANK 08	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.12	0.12	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.34	0.34	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2586805) - continued									
ES1929844-008	TRIP BLANK 08	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.22	0.22	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1929844-008	TRIP BLANK 08	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2586805)									
ES1929819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	5.53	5.55	0.361	0% - 20%
ES1929844-008	TRIP BLANK 08	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 2587556)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	99.3	98.5	102
EA005: pH (QCLot: 2587557)								
EA005: pH Value	----	----	pH Unit	----	7.6 pH Unit	99.3	98.5	102
EA005P: pH by PC Titrator (QCLot: 2588437)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2588439)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	# 92.5	95.0	113
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2590822)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	99.4	87.0	109
				<10	293 mg/L	116	66.0	126
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 2590824)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	103	87.0	109
				<10	293 mg/L	113	66.0	126
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2590821)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	83.0	129
				<5	1000 mg/L	97.0	82.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2590823)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	101	83.0	129
				<5	1000 mg/L	96.0	82.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 2588435)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	85.7	81.0	111
				----	50 mg/L	96.5	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2588694)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	100	82.0	122
				<1	500 mg/L	90.8	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2588697)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	81.0	80.9	127
				<1	1000 mg/L	110	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2589435)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.3	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	82.0	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 2589435) - continued								
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.9	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589432)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.8	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	91.8	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.9	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.8	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.0	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.6	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.6	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.6	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	98.4	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	93.9	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	92.3	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.4	82.0	112
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	86.0	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	107	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.9	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	94.6	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	93.6	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	97.6	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.2	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.1	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	103	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.5	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	87.2	85.0	115
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	95.4	82.0	112
EG035F: Dissolved Mercury by FIMS (QCLot: 2589433)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.3	83.0	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2589436)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.3	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2588436)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK040P: Fluoride by PC Titrator (QCLot: 2588436) - continued								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	104	82.0	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588661)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	103	90.0	114
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588662)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	100	90.0	114
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2588696)								
EK057G: Nitrite as N	14797-65-0	0.01	mg/L	<0.01	0.5 mg/L	101	82.0	114
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588660)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	91.0	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588663)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	98.8	91.0	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588656)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	81.6	69.0	101
				<0.1	1 mg/L	73.5	70.0	118
				<0.1	5 mg/L	78.5	74.0	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588659)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	84.2	69.0	101
				<0.1	1 mg/L	85.6	70.0	118
				<0.1	5 mg/L	91.5	74.0	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588657)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.6	71.0	101
				<0.01	0.442 mg/L	88.5	72.0	108
				<0.01	1 mg/L	91.2	78.0	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588658)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	82.5	71.0	101
				<0.01	0.442 mg/L	85.7	72.0	108
				<0.01	1 mg/L	88.8	78.0	118
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695)								
EK071G: Reactive Phosphorus as P	14265-44-2	0.01	mg/L	<0.01	0.5 mg/L	104	85.0	117
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2587268)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	76.1	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	86.2	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	56.6	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2587268)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	102	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	69.3	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	80.0	61.5	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2591332)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	90.5	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2591332)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	96.0	75.0	127
EP080: BTEXN (QCLot: 2591332)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.8	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	102	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	102	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	103	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.4	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.9	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2586805)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	97.0	70.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	95.0	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	103	70.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	106	70.0	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2586805)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	105	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	106	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	115	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	107	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	112	70.0	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	102	70.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	105	70.0	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	111	70.0	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	114	70.0	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	114	70.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	102	70.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	100	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	109	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	115	70.0	150

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	110	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	104	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2586805)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	109	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	103	70.0	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70.0	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	122	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2588694)							
ES1929844-001	BH7	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2588697)							
ES1929844-001	BH7	ED045G: Chloride	16887-00-6	250 mg/L	123	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589432)							
ES1929827-004	Anonymous	EG020A-F: Arsenic	7440-38-2	10 mg/L	91.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	10 mg/L	88.2	70.0	130
		EG020A-F: Barium	7440-39-3	10 mg/L	91.6	70.0	130
		EG020A-F: Cadmium	7440-43-9	2.5 mg/L	85.1	70.0	130
		EG020A-F: Chromium	7440-47-3	10 mg/L	86.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	10 mg/L	89.0	70.0	130
		EG020A-F: Copper	7440-50-8	10 mg/L	87.3	70.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	84.1	70.0	130
		EG020A-F: Manganese	7439-96-5	10 mg/L	85.6	70.0	130
		EG020A-F: Nickel	7440-02-0	10 mg/L	86.0	70.0	130
		EG020A-F: Vanadium	7440-62-2	10 mg/L	91.7	70.0	130
		EG020A-F: Zinc	7440-66-6	10 mg/L	87.4	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437)							
ES1929844-004	MW239S	EG020A-F: Arsenic	7440-38-2	1 mg/L	85.5	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	80.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	91.2	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2589437) - continued							
ES1929844-004	MW239S	EG020A-F: Cadmium	7440-43-9	0.25 mg/L	85.3	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	82.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	85.3	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	85.7	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	86.0	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	85.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	84.1	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	85.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	94.7	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2589433)							
ES1929827-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	83.5	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2589436)							
ES1929844-003	BH8	EG035F: Mercury	7439-97-6	0.01 mg/L	81.2	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2588436)							
ES1929784-010	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	81.0	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588661)							
ES1929664-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	108	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 2588662)							
ES1929844-010	BH4	EK055G: Ammonia as N	7664-41-7	1 mg/L	110	70.0	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 2588696)							
ES1929844-001	BH7	EK057G: Nitrite as N	14797-65-0	0.5 mg/L	109	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588660)							
ES1929631-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	96.7	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2588663)							
ES1929844-010	BH4	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	98.4	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588656)							
ES1929664-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	50 mg/L	87.6	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2588659)							
ES1929844-005	SW3	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	88.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588657)							
ES1929664-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	93.3	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2588658)							
ES1929844-005	SW3	EK067G: Total Phosphorus as P	----	1 mg/L	102	70.0	130
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695)							

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 2588695) - continued							
ES1929844-001	BH7	EK071G: Reactive Phosphorus as P	14265-44-2	0.5 mg/L	103	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2591332)							
ES1929844-002	BH6	EP080: C6 - C9 Fraction	----	325 µg/L	88.0	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2591332)							
ES1929844-002	BH6	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	86.0	70.0	130
EP080: BTEXN (QCLot: 2591332)							
ES1929844-002	BH6	EP080: Benzene	71-43-2	25 µg/L	93.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	96.7	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	95.9	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	98.7	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.8	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	107	50.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	109	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	95.6	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	115	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	123	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	112	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	103	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	130	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	118	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	119	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	117	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	113	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	117	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	118	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	121	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	97.0	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	123	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	119	50.0	150

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2586805) - continued							
ES1929819-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	106	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	123	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	122	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	120	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	120	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2586805)							
ES1929819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	118	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	113	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	120	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	118	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1929844**	Page	: 1 of 15
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 16-Sep-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 23-Sep-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 14
Order number	: ----	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EA010P: Conductivity by PC Titrator	QC-2588439-002	----	**Electrical Conductivity @ 25°C**	----	92.5 %	95.0-113%	**Recovery less than lower control limit**
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1929819--001	Anonymous	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	----	----	----	17-Sep-2019	16-Sep-2019	**1**
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
SW4	----	----	----	17-Sep-2019	16-Sep-2019	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005: pH							
Clear Plastic Bottle - Natural (EA005)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	16-Sep-2019	×
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
SW4	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	16-Sep-2019	×
EA006: Sodium Adsorption Ratio (SAR)							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	14-Oct-2019	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	23-Sep-2019	✓
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	23-Sep-2019	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	14-Oct-2019	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	30-Sep-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	14-Oct-2019	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH7, BH6, BH8, MW239S, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH1, BH4, DUP08, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	14-Mar-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH7, BH6, BH8, MW239S, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH1, BH4, DUP08, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**18-Sep-2019**	14-Oct-2019	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK055G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓
EK057G: Nitrite as N by Discrete Analyser							
Clear Plastic Bottle - Natural (EK057G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	18-Sep-2019	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	14-Oct-2019	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**17-Sep-2019**	14-Oct-2019	✓	**17-Sep-2019**	14-Oct-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
BH7, BH6, BH8, MW239S, SW3, SW4, BH1, BH4, SW1, BH11, BH2	**16-Sep-2019**	**17-Sep-2019**	14-Oct-2019	✓	**17-Sep-2019**	14-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK071G: Reactive Phosphorus as P by discrete analyser							
Clear Plastic Bottle - Natural (EK071G)							
BH7, BH8, SW3, BH1, SW1, BH2, BH6, MW239S, SW4, BH4, BH11,	**16-Sep-2019**	**----**	----	----	**17-Sep-2019**	18-Sep-2019	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11, BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2	**16-Sep-2019**	**18-Sep-2019**	23-Sep-2019	✓	**19-Sep-2019**	28-Oct-2019	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11, BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2	**16-Sep-2019**	**18-Sep-2019**	23-Sep-2019	✓	**19-Sep-2019**	28-Oct-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH7, BH8, SW3, RINSATE 08, BH1, DUP08, BH11, BH6, MW239S, SW4, TRIP BLANK 08, BH4, SW1, BH2	**16-Sep-2019**	**20-Sep-2019**	30-Sep-2019	✓	**20-Sep-2019**	30-Sep-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH7, BH6, BH8, MW239S, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH1, BH4, DUP08, SW1, BH11, BH2	**16-Sep-2019**	**20-Sep-2019**	30-Sep-2019	✓	**20-Sep-2019**	30-Sep-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH7, BH6, BH8, MW239S, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH1, BH4, DUP08, SW1, BH11, BH2	**16-Sep-2019**	**20-Sep-2019**	30-Sep-2019	✓	**20-Sep-2019**	30-Sep-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH7, BH6, BH8, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH4, DUP08, SW1	**16-Sep-2019**	**17-Sep-2019**	14-Mar-2020	✓	**17-Sep-2019**	14-Mar-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH7, BH6, BH8, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH4, DUP08, SW1	**16-Sep-2019**	**17-Sep-2019**	14-Mar-2020	✓	**17-Sep-2019**	14-Mar-2020	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH7, BH6, BH8, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH4, DUP08, SW1	**16-Sep-2019**	**17-Sep-2019**	14-Mar-2020	✓	**17-Sep-2019**	14-Mar-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH7, BH6, BH8, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH4, DUP08, SW1	**16-Sep-2019**	**17-Sep-2019**	14-Mar-2020	✓	**17-Sep-2019**	14-Mar-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH7, BH6, BH8, SW3, SW4, RINSATE 08, TRIP BLANK 08, BH4, DUP08, SW1	**16-Sep-2019**	**17-Sep-2019**	14-Mar-2020	✓	**17-Sep-2019**	14-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	4	32	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	33	**12.12**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Ammonia as N by Discrete analyser	EK055G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH	EA005	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	7	**28.57**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	38	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	38	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	2	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	32	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	33	**6.06**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Reactive Phosphorus as P-By Discrete Analyser	EK071G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH	EA005	WATER	In house: Referenced to APHA 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P-By Discrete Analyser	EK071G	WATER	In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1931069**	Page	: 1 of 5
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 25-Sep-2019 10:40
Order number	: ----	Date Analysis Commenced	: 27-Sep-2019
C-O-C number	: ----	Issue Date	: 01-Oct-2019 16:15
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	BH4	RINSATE 09	TRIP BLANK 09	----
				Client sampling date / time	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1931069-001	ES1931069-002	ES1931069-003	ES1931069-004	--------
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		**0.05**	<0.01	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW4	BH4	RINSATE 09	TRIP BLANK 09	----
				Client sampling date / time	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00	----
Compound	CAS Number	LOR	Unit		ES1931069-001	ES1931069-002	ES1931069-003	ES1931069-004	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**0.05**	<0.01	<0.01	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.05**	<0.01	<0.01	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.05**	<0.01	<0.01	<0.01	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**96.1**	**101**	**102**	**98.7**	----
13C8-PFOA	----	0.02	%		**96.7**	**101**	**102**	**95.7**	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1931069**	Page	: 1 of 7
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 25-Sep-2019
Order number	: ----	Date Analysis Commenced	: 27-Sep-2019
C-O-C number	: ----	Issue Date	: 01-Oct-2019
Sampler	: DANIEL KOUSBROEK		
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2609456) - continued									
ES1931069-004	TRIP BLANK 09	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2609456) - continued									
EB1924576-012	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2609456)									
EB1924576-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES1931069-004	TRIP BLANK 09	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2609456)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	81.8	70.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	90.8	70.0	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	78.8	70.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	88.6	70.0	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	86.0	70.0	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	73.8	70.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2609456)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	102	70.0	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	103	70.0	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	91.6	70.0	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	102	70.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	96.0	70.0	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	88.4	70.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	91.4	70.0	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	94.0	70.0	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	75.8	70.0	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	81.4	70.0	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	79.7	70.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	108	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	94.3	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	80.6	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	1.25 µg/L	101	70.0	150
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	97.4	70.0	150
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	90.0	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	107	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.8	70.0	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	91.8	70.0	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	93.2	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	77.0	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	91.2	50.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	101	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	83.8	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.4	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	96.4	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	86.2	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	114	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	114	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	104	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	114	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	113	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	101	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	103	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	111	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	103	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	91.6	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	93.1	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	123	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	112	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	91.0	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25 µg/L	114	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	124	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	104	50.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2609456) - continued							
EB1924576-012	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	126	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2609456)							
EB1924576-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	96.8	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	104	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	112	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	106	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1931069**	Page	: 1 of 4
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: 20193820	Date Samples Received	: 25-Sep-2019
Site	: WSS-CABBAGE TREE RD WATER MONITORING	Issue Date	: 01-Oct-2019
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW4, BH4, RINSATE 09, TRIP BLANK 09	**25-Sep-2019**	**27-Sep-2019**	23-Mar-2020	✓	**30-Sep-2019**	23-Mar-2020	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
SW4, BH4, RINSATE 09, TRIP BLANK 09	**25-Sep-2019**	**27-Sep-2019**	23-Mar-2020	✓	**30-Sep-2019**	23-Mar-2020	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
SW4, BH4, RINSATE 09, TRIP BLANK 09	**25-Sep-2019**	**27-Sep-2019**	23-Mar-2020	✓	**30-Sep-2019**	23-Mar-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW4, BH4, RINSATE 09, TRIP BLANK 09	**25-Sep-2019**	**27-Sep-2019**	23-Mar-2020	✓	**30-Sep-2019**	23-Mar-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
SW4, BH4, RINSATE 09, TRIP BLANK 09	**25-Sep-2019**	**27-Sep-2019**	23-Mar-2020	✓	**30-Sep-2019**	23-Mar-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. Where commercially available, isotopically labelled analogues of the target analytes are used as internal standards for quantification. Where a labelled analogue is not commercially available, the internal standard with similar chemistry and the closest retention time to the target is used for quantification. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. This method complies with the quality control definitions as stated in QSM 5.1. Data is reviewed in line with the DQOs as stated in QSM5.1

Preparation Methods	Method	Matrix	Method Descriptions
Preparation for PFAS in water.	EP231-PR	WATER	Method presumes direct injection without workup. Preparation includes addition of internal standard and surrogate, and filtration prior to anaylsis.

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

KLEINFELDER
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Client:	SITE, COC AND CONTACT DATA				Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cabbage Tree Rd water monitoring	Sampler Name:	Dan Kousbroek	ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19	Contact Number:	045 8197 676	
	Job No.	[redacted] 20193820	Contact e-mail:	dkousbroek@kleinfelder.com	
	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days	PM name (if not sampler):	Tom Overton	
	Data QA level	LAB minimum unless specified:	PM e-mail:	toverton@kleinfelder.com	

CHAIN OF CUSTODY								Send Results to:
Relinquished by (print): D. Kousbroek Changing Sort	Received by (print):		Relinquished:		Received by: HJ			
(sign)	(sign)		(sign)		(sign)			95 Mitchell Road
Date / Time: 25/9	Date / Time:	25/9/19 10:39	Date / Time:	25/9/19 17:00	Date / Time:	25.9.19		Cardiff, NSW 2285
Notes:	Temp. (°C)	0.5	Notes:		Temp. (°C)	7:35 pm		newcastle@kleinfelder.com
	Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal		Phone: 02 4949 5200

Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-05 SG								Metals: Additional Metals to make up NEPM 15	Metals: Iron (dissolved)		Other Analytes: General Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: PFAS (28 analytes, standard level)		Comments
SW4	1			25/9				1															X	
BH4	2			↓				1															X	
Rinsate09	3							1															X	
Trip Blank09	4							1															X	

Environmental Division
Sydney
Work Order Reference
ES1931069

Telephone : + 61-2-8784 8555

W-05 SG - TRH/BTEXN/ 8 Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

E-MAILED

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1929844**

Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: dkousbroek@kleinfelder.com	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: ----	Telephone	: +6138549 9630
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 20193820	Page	: 1 of 3
Order number	: ----	Quote number	: EM2019ALLENVENG0010 (ME/114/19)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: WSS-CABBAGE TREE RD WATER MONITORING		
Sampler	: DANIEL KOUSBROEK		

Dates

Date Samples Received	: 16-Sep-2019 16:29	Issue Date	: 16-Sep-2019
Client Requested Due Date	: 20-Sep-2019	Scheduled Reporting Date	: **20-Sep-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 3.8'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 14 / 14

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Sample TRIP08 to be forwarded to Eurofins as per COC's.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **pH analysis will be conducted by ALS Newcastle-Water.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EA025H Suspended Solids - Standard Level	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-14 Extended Water Suite B	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-05 SG TRH/BTEXN/8 Metals inc Silica Gel Clean Up
ES1929844-001	16-Sep-2019 00:00	BH7	✓	✓	✓	✓	✓	✓	✓
ES1929844-002	16-Sep-2019 00:00	BH6	✓	✓	✓	✓	✓	✓	✓
ES1929844-003	16-Sep-2019 00:00	BH8	✓	✓	✓	✓	✓	✓	✓
ES1929844-004	16-Sep-2019 00:00	MW239S	✓	✓	✓		✓	✓	✓
ES1929844-005	16-Sep-2019 00:00	SW3	✓	✓	✓	✓	✓	✓	✓
ES1929844-006	16-Sep-2019 00:00	SW4	✓	✓	✓	✓	✓	✓	✓
ES1929844-007	16-Sep-2019 00:00	RINSATE 08			✓	✓		✓	✓
ES1929844-008	16-Sep-2019 00:00	TRIP BLANK 08			✓	✓		✓	✓
ES1929844-009	16-Sep-2019 00:00	BH1	✓	✓	✓		✓	✓	✓
ES1929844-010	16-Sep-2019 00:00	BH4	✓	✓	✓	✓	✓	✓	✓
ES1929844-011	16-Sep-2019 00:00	DUP08			✓	✓		✓	✓
ES1929844-012	16-Sep-2019 00:00	SW1	✓	✓	✓	✓	✓	✓	✓
ES1929844-013	16-Sep-2019 00:00	BH11	✓	✓	✓		✓	✓	✓
ES1929844-014	16-Sep-2019 00:00	BH2	✓	✓	✓		✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH pH
ES1929844-001	16-Sep-2019 00:00	BH7	✓
ES1929844-002	16-Sep-2019 00:00	BH6	✓
ES1929844-003	16-Sep-2019 00:00	BH8	✓
ES1929844-004	16-Sep-2019 00:00	MW239S	✓
ES1929844-005	16-Sep-2019 00:00	SW3	✓
ES1929844-006	16-Sep-2019 00:00	SW4	✓
ES1929844-009	16-Sep-2019 00:00	BH1	✓
ES1929844-010	16-Sep-2019 00:00	BH4	✓
ES1929844-012	16-Sep-2019 00:00	SW1	✓
ES1929844-013	16-Sep-2019 00:00	BH11	✓

			WATER - EA005: pH pH
ES1929844-014	16-Sep-2019 00:00	BH2	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

DANIEL KOUSBROEK

- *AU Certificate of Analysis - NATA (COA)	Email	dkousbroek@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	dkousbroek@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	dkousbroek@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	dkousbroek@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	dkousbroek@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	dkousbroek@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	dkousbroek@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	dkousbroek@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	dkousbroek@kleinfelder.com

INVOICES

- A4 - AU Tax Invoice (INV)	Email	Aus_Accounts@kleinfelder.com

Newcastle

- *AU Certificate of Analysis - NATA (COA)	Email	newcastle@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	newcastle@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	newcastle@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	newcastle@kleinfelder.com
- A4 - AU Tax Invoice (INV)	Email	newcastle@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	newcastle@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	newcastle@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	newcastle@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	newcastle@kleinfelder.com

TOM OVERTON

- *AU Certificate of Analysis - NATA (COA)	Email	toverton@kleinfelder.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	toverton@kleinfelder.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	toverton@kleinfelder.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	toverton@kleinfelder.com
- Chain of Custody (CoC) (COC)	Email	toverton@kleinfelder.com
- EDI Format - ENMRG (ENMRG)	Email	toverton@kleinfelder.com
- EDI Format - EQuIS V5 for KLEINFELDER (KLEINFELDER)	Email	toverton@kleinfelder.com
- EDI Format - ESDAT (ESDAT)	Email	toverton@kleinfelder.com

KLEINFELDER AUSTRALIA PTY LTD

Page 1 of 1

COC number:

6711582

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20/9

Client:	SITE, COC AND CONTACT DATA						Laboratory:
Kleinfelder Australia Pty Ltd 95 Mitchell Road Cardiff, NSW 2285 Phone: 02 4949 5200	Site Name:	WSS - Cabbage Tree Rd water monitoring		Sampler Name	Dan Kousbroek		ALS 5/585 Maitland Rd Mayfield West, Newcastle NSW 2304 Phone: (02) 4014 2500
	QUOTE NUMBER	ME/114/19		Contact Number	045 8197 676		
	Job No.	20193820		Contact e-mail	dkousbroek@kleinfelder.com		
	Required TAT:	24 hrs 48 hrs 3 days 5 days 7 days		PM name (if not sampler)	Tom Overton		
	Data QA level:	LAB minimum unless specified		PM e-mail	toverton@kleinfelder.com		

CHAIN OF CUSTODY							
Relinquished by (print):	Daniel Keusbroek	Received by (print):		Relinquished (sign)		Received by: (sign)	Rupam
(sign)		(sign)					
Date / Time:	16/9	Date / Time:	16/9/19 14:30	Date / Time:		Date / Time	17/09 4:45PM
Notes:		Temp (°C)	3.8	Notes:		Temp (°C)	
		Notes:	ice present / no ice seals intact / no seal			Notes:	ice present / no ice seals intact / no seal

Send Results to:
dkousbroek@kleinfelder.com & toverton@kleinfelder.com
95 Mitchell Road
Cardiff, NSW 2285
newcastle@kleinfelder.com
Phone: 02 4949 5200

	Sample ID	Lab ID	Sample Point	Sample Type	Date	Start Depth	End Depth	Units	# Containers	Organic Analytes: W-66 SG TRH/BTEXN	Metals: W-03 Metals - NEPM 15	Metals: Iron (dissolved)	Other Analytes: NT 14 - Extended Water Suite	Other Analytes: Total Dissolved Solids (TDS)	Other Analytes: Total Suspended Solids (TSS)	Other Analytes: ES231X PFAS (28 analytes, standard level)	Comments
1	BH7	1			16/9				7	X	X	X	X	X	X	X	
2	BH6	2							7	X	X	X	X	X	X	X	
3	BH8	3							7	X	X	X	X	X	X	X	
4	MW239	4							6	X	X	X	X	X	X		
5	SW3	5							7	X	X	X	X	X	X	X	
6	SW4	6							7	X	X	X	X	X	X	X	
7	Rinse 08	7							5	X	X	X				X	
8	Trip Blank 08	8							5	X	X	X				X	
9	BH1	9							6	X	X	X	X	X	X		
10	BH4	10							7	X	X	X	X	X	X	X	
11	Dup08	11							5	X	X	X				X	
	Trip08								5	X	X	X				X	
12	SW1	12							7	X	X	X	X	X	X	X	* Send to Eurofins.
13	DH11	13							6	X	X	X	X	X	X	X	
14	BH2	14			↓				6	X	X	X	X	X	X		

Subcon (forward Lab / Split WO / Tat / Analysis / Organised By / Date / Relinquished By / Date / Courier / WO No. / Attached By PO / Internal Sheet)

Environmental Division
Sydney
Work Order Reference
ES1929844

Telephone : + 61-2-8784 8555

W-66 SG - TRH/BTEXN & Metals Silica Gel Clean Up
NT14 - Extended water suite B
Additional metals analysis to make up NEPM 15

Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)

Boron (B), Barium (Ba), Beryllium (Be), Cobalt (Co), Manganese (Mn), Selenium (Se), Vanadium (V)

pH & WN.

eurofins | Environment Testing

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NATA # 1261
Site # 1254 & 14271

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NATA # 1261 Site # 20794

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Kleinfelder Aust Pty Ltd (NEWCASTLE)**
Contact name:	Tom Overton
Project name:	WSS - CABBAGE TREE RD WATER MONITORING
Project ID:	20193820
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Sep 17, 2019 4:45 PM
Eurofins reference:	**677582**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Tom Overton - toverton@kleinfelder.com.

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NATA # 1261
Site # 23736

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285

Order No.:
Report #: 677582
Phone: 02 4949 5200
Fax:

Received: Sep 17, 2019 4:45 PM
Due: Sep 24, 2019
Priority: 5 Day
Contact Name: Tom Overton

Project Name: WSS - CABBAGE TREE RD WATER MONITORING
Project ID: 20193820

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	Metals M8 filtered	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794												X
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	TRIP08	Sep 16, 2019		Water	S19-Se27286	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Tom Overton**

Report **677582-W**
Project name WSS - CABBAGE TREE RD WATER MONITORING
Project ID 20193820
Received Date Sep 17, 2019

Client Sample ID			**TRIP08**
Sample Matrix			**Water**
Eurofins Sample No.			**S19-Se27286**
Date Sampled			**Sep 16, 2019**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	0.20
TRH C15-C28	0.1	mg/L	0.4
TRH C29-C36	0.1	mg/L	0.2
TRH C10-C36 (Total)	0.1	mg/L	0.8
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	147
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	0.18
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	0.18
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.68
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005

Client Sample ID			TRIP08
Sample Matrix			Water
Eurofins Sample No.			S19-Se27286
Date Sampled			Sep 16, 2019
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.04
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	0.002
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	0.69
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.037
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	65
13C5-PFPeA (surr.)	1	%	61
13C5-PFHxA (surr.)	1	%	77
13C4-PFHpA (surr.)	1	%	85
13C8-PFOA (surr.)	1	%	87
13C5-PFNA (surr.)	1	%	93
13C6-PFDA (surr.)	1	%	89
13C2-PFUnDA (surr.)	1	%	77
13C2-PFDoDA (surr.)	1	%	72
13C2-PFTeDA (surr.)	1	%	78
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	79

Client Sample ID			TRIP08
Sample Matrix			Water
Eurofins Sample No.			S19-Se27286
Date Sampled			Sep 16, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D3-N-MeFOSA (surr.)	1	%	61
D5-N-EtFOSA (surr.)	1	%	66
D7-N-MeFOSE (surr.)	1	%	91
D9-N-EtFOSE (surr.)	1	%	79
D5-N-EtFOSAA (surr.)	1	%	90
D3-N-MeFOSAA (surr.)	1	%	70
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.03
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	130
18O2-PFHxS (surr.)	1	%	125
13C8-PFOS (surr.)	1	%	113
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	66
13C2-6:2 FTSA (surr.)	1	%	111
13C2-8:2 FTSA (surr.)	1	%	87
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	0.03
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.03
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.03
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Sep 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 17, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Sep 17, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Sydney	Sep 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Sydney	Sep 17, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent)	Sydney	Sep 17, 2019	28 Days
- Method: E057 Total Speciated Chromium			
Chromium (trivalent filtered)	Sydney	Sep 17, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Metals M8 filtered	Sydney	Sep 17, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Sep 18, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Sep 19, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Sep 19, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Sep 19, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Sep 19, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**	
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	677582
		Phone:	02 4949 5200
		Fax:	
Project Name:	WSS - CABBAGE TREE RD WATER MONITORING		
Project ID:	20193820		

Received:	Sep 17, 2019 4:45 PM	
Due:	Sep 24, 2019	
Priority:	5 Day	
Contact Name:	Tom Overton	

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	Metals M8 filtered	BTEX and Naphthalene	TRH (after Silica Gel cleanup)	Total Recoverable Hydrocarbons	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271												
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	
Brisbane Laboratory - NATA Site # 20794												X
Perth Laboratory - NATA Site # 23736												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	TRIP08	Sep 16, 2019		Water	S19-Se27286	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	102			70-130	Pass	
TRH C10-C14	%	120			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	109			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	110			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
o-Xylene	%	112			70-130	Pass	
Xylenes - Total	%	111			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	120			70-130	Pass	
TRH C6-C10	%	101			70-130	Pass	
TRH >C10-C16	%	108			70-130	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	71			70-130	Pass	
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	71			70-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	96			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	97			70-130	Pass	
Barium (filtered)	%	93			70-130	Pass	
Beryllium (filtered)	%	96			70-130	Pass	
Boron (filtered)	%	80			70-130	Pass	
Cadmium (filtered)	%	109			70-130	Pass	
Chromium (filtered)	%	98			70-130	Pass	
Cobalt (filtered)	%	96			70-130	Pass	
Copper (filtered)	%	95			70-130	Pass	
Iron (filtered)	%	95			70-130	Pass	
Lead (filtered)	%	96			70-130	Pass	
Manganese (filtered)	%	95			70-130	Pass	
Mercury (filtered)	%	94			70-130	Pass	
Nickel (filtered)	%	97			70-130	Pass	
Vanadium (filtered)	%	96			70-130	Pass	
Zinc (filtered)	%	94			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	79			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	91			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	92			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	103			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	101			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	104			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	83			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	110			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	103			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	99			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	90			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	103			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	108			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	111			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	97			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	110			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	94			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	103			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	69			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctanesulfonic acid (PFOS)			%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	103			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	91			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	142			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	103			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	108			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S19-Se28681	NCP	%	72			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S19-Se28681	NCP	%	82			70-130	Pass	
Toluene	S19-Se28681	NCP	%	83			70-130	Pass	
Ethylbenzene	S19-Se28681	NCP	%	85			70-130	Pass	
m&p-Xylenes	S19-Se28681	NCP	%	84			70-130	Pass	
o-Xylene	S19-Se28681	NCP	%	84			70-130	Pass	
Xylenes - Total	S19-Se28681	NCP	%	84			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S19-Se28681	NCP	%	85			70-130	Pass	
TRH C6-C10	S19-Se28681	NCP	%	71			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	S19-Se29873	NCP	%	36			70-130	Fail	Q08
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-Se26165	NCP	%	92			70-130	Pass	
Barium (filtered)	S19-Se26165	NCP	%	89			70-130	Pass	
Beryllium (filtered)	S19-Se26165	NCP	%	119			70-130	Pass	
Boron (filtered)	S19-Se26165	NCP	%	82			70-130	Pass	
Cadmium (filtered)	S19-Se26165	NCP	%	107			70-130	Pass	
Chromium (filtered)	S19-Se26165	NCP	%	93			70-130	Pass	
Cobalt (filtered)	S19-Se26165	NCP	%	91			70-130	Pass	
Copper (filtered)	S19-Se26165	NCP	%	92			70-130	Pass	
Iron (filtered)	S19-Se26165	NCP	%	84			70-130	Pass	
Lead (filtered)	S19-Se26165	NCP	%	94			70-130	Pass	
Manganese (filtered)	S19-Se26165	NCP	%	78			70-130	Pass	
Mercury (filtered)	S19-Se26165	NCP	%	87			70-130	Pass	
Nickel (filtered)	S19-Se26165	NCP	%	93			70-130	Pass	
Vanadium (filtered)	S19-Se26165	NCP	%	92			70-130	Pass	
Zinc (filtered)	S19-Se26165	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S19-Se28429	NCP	%	106			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S19-Se28429	NCP	%	63			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S19-Se28429	NCP	%	76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S19-Se28429	NCP	%	108			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S19-Se28429	NCP	%	83			50-150	Pass	
Perfluorononanoic acid (PFNA)	S19-Se28429	NCP	%	100			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S19-Se28429	NCP	%	95			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroundecanoic acid (PFUnDA)	S19-Se28429	NCP	%	99			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S19-Se28429	NCP	%	97			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S19-Se28429	NCP	%	94			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S19-Se28429	NCP	%	110			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S19-Se28429	NCP	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Se28429	NCP	%	93			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Se28429	NCP	%	87			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Se28429	NCP	%	85			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Se28429	NCP	%	86			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Se28429	NCP	%	102			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Se28429	NCP	%	102			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S19-Se28429	NCP	%	94			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S19-Se28429	NCP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S19-Se28429	NCP	%	87			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S19-Se28429	NCP	%	102			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S19-Se28429	NCP	%	96			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S19-Se28429	NCP	%	83			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S19-Se28429	NCP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S19-Se28429	NCP	%	80			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Se28429	NCP	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Se28429	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Se28429	NCP	%	115			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Se28429	NCP	%	117			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-Se28680	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-Se28680	NCP	mg/L	0.010	0.009	8.0	30%	Pass	
Ethylbenzene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-Se28680	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-Se28680	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-Se28680	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-Se28680	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-Se28680	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	S19-Se29644	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	S19-Se27286	CP	mg/L	0.04	0.04	1.0	30%	Pass	
Beryllium (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	S19-Se27286	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	S19-Se27286	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S19-Se27286	CP	mg/L	0.002	0.002	1.0	30%	Pass	
Copper (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S19-Se27286	CP	mg/L	0.69	0.69	<1	30%	Pass	
Lead (filtered)	S19-Se27286	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S19-Se27286	CP	mg/L	0.037	0.036	2.0	30%	Pass	
Mercury (filtered)	S19-Se27286	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S19-Se27286	CP	mg/L	0.003	0.003	6.0	30%	Pass	
Vanadium (filtered)	S19-Se27286	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S19-Se27286	CP	mg/L	0.012	0.011	5.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-Se27052	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

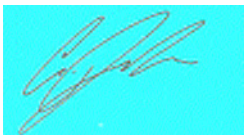
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Bryan Wilson	Senior Analyst-PFAS (QLD)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)



Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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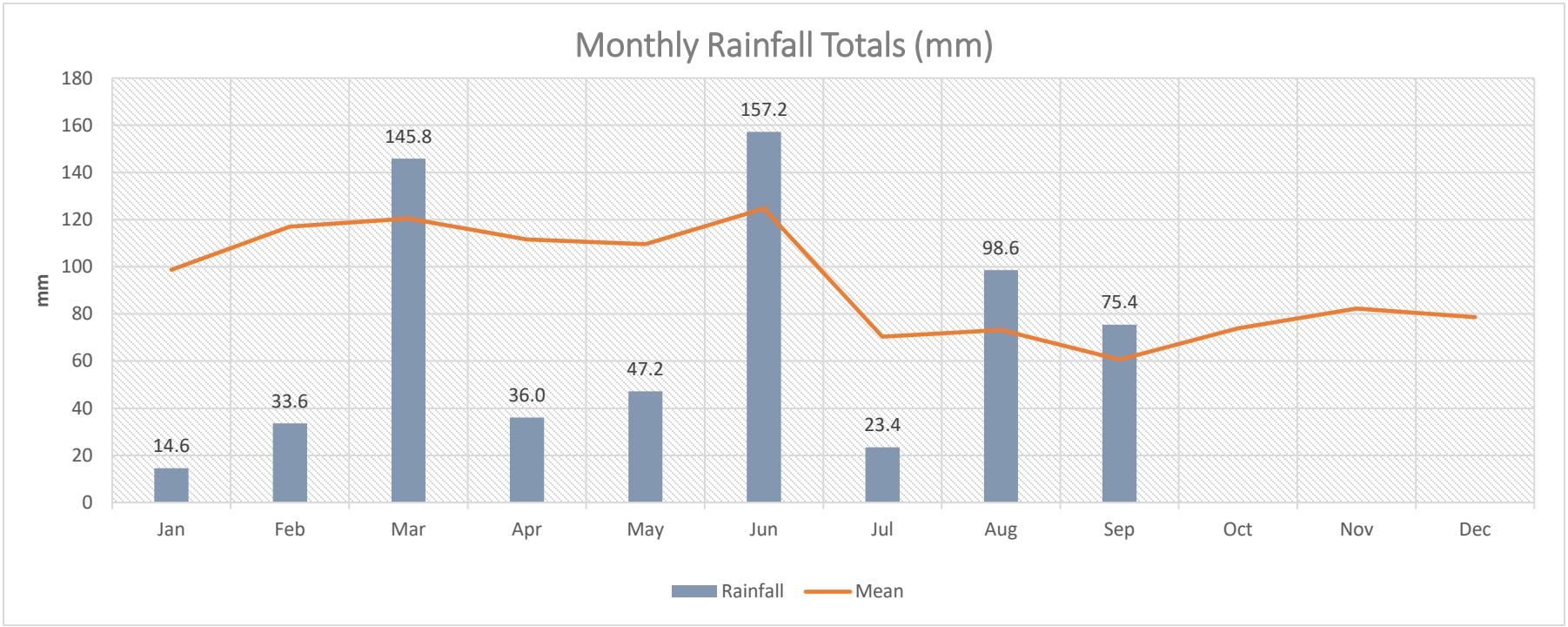
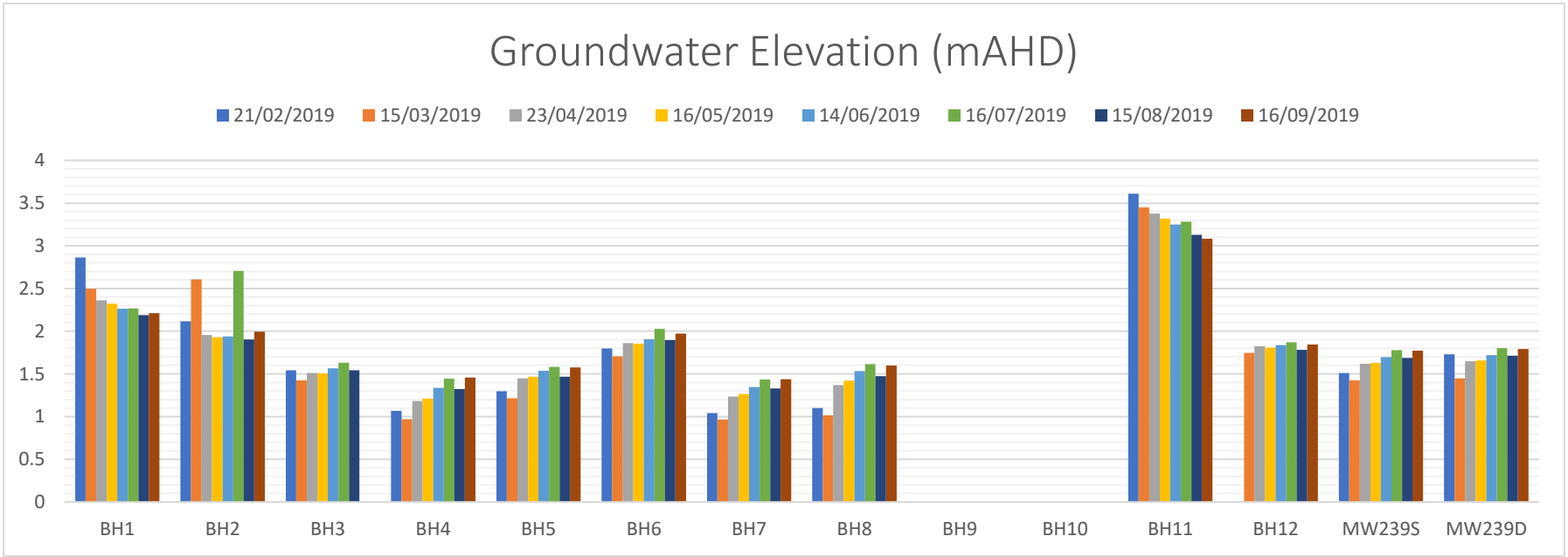
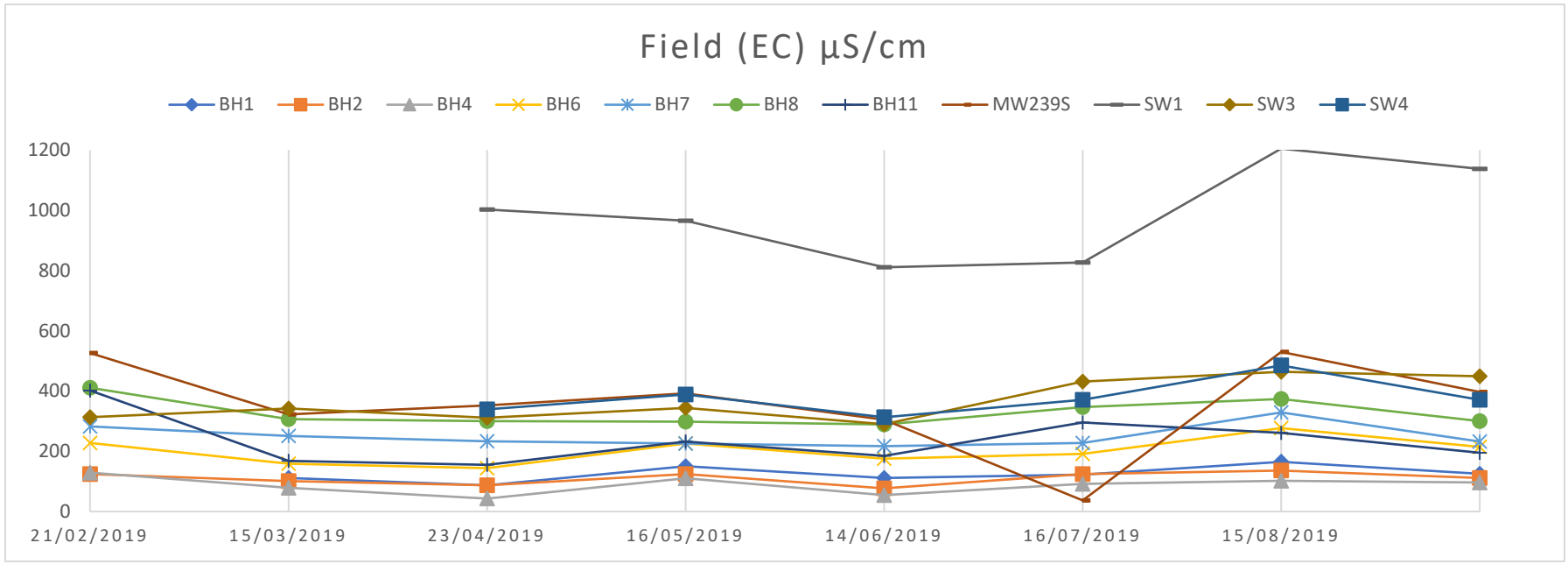
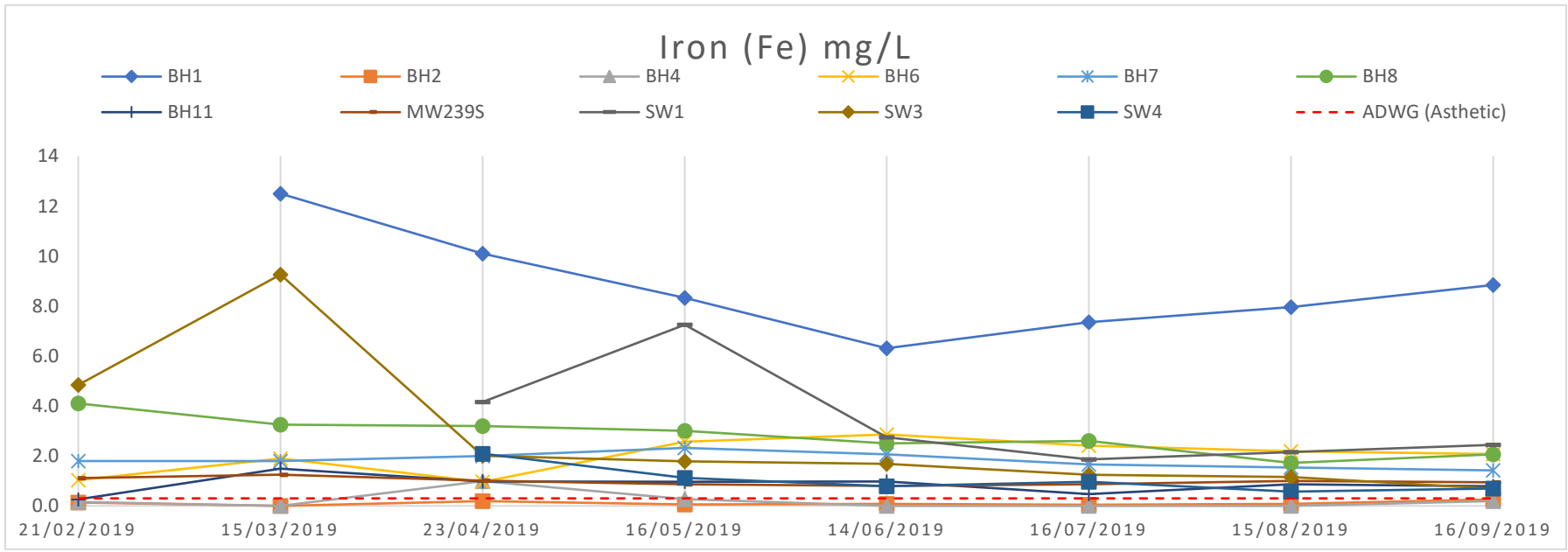
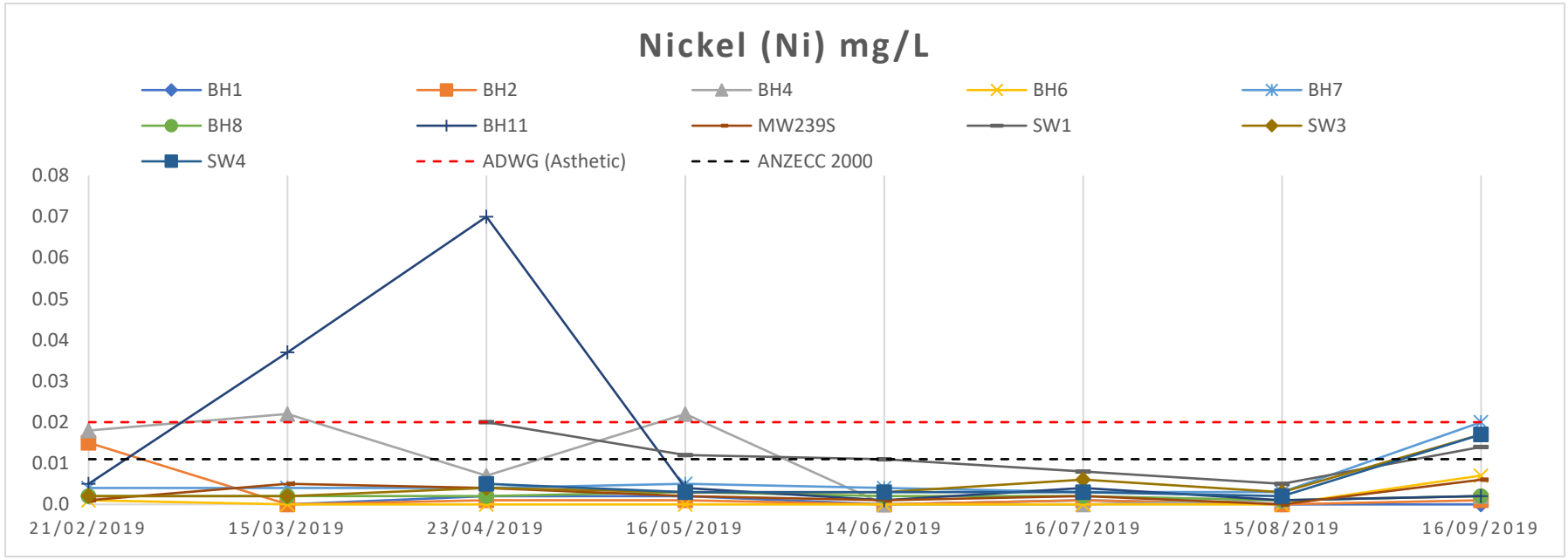
APPENDIX B: TREND DATA

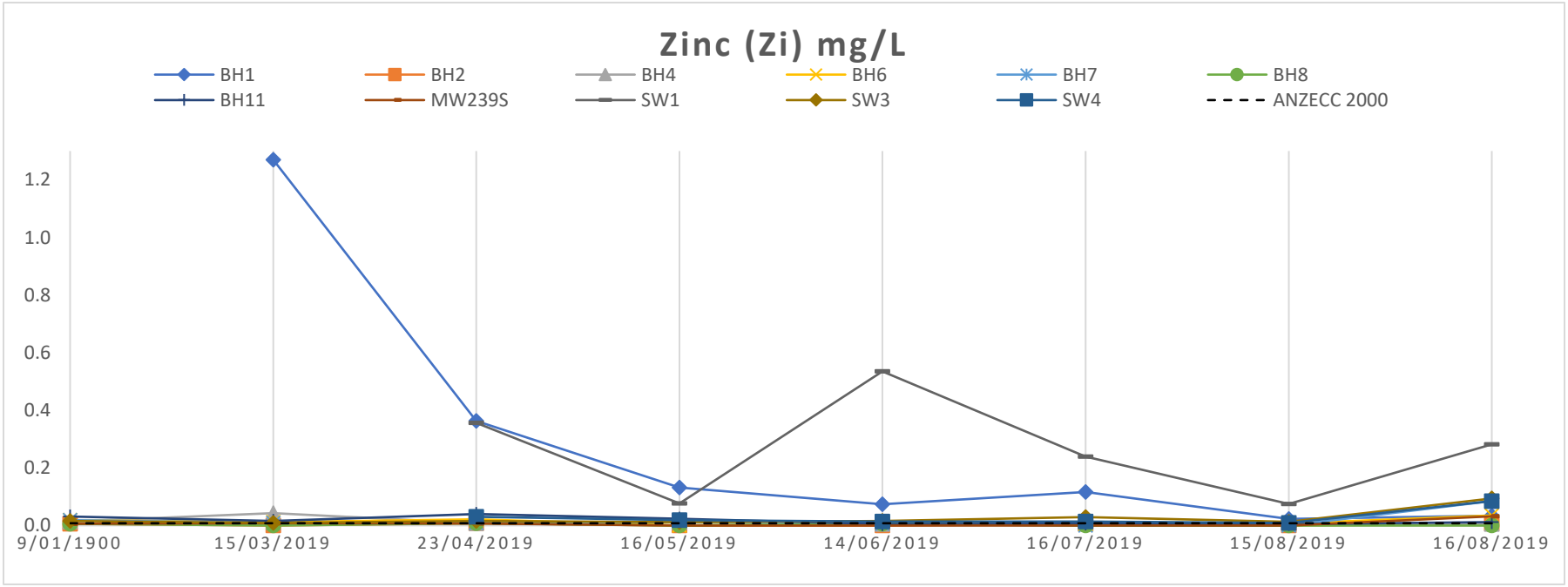

Monthly Rainfall Totals (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Rainfall
Mean

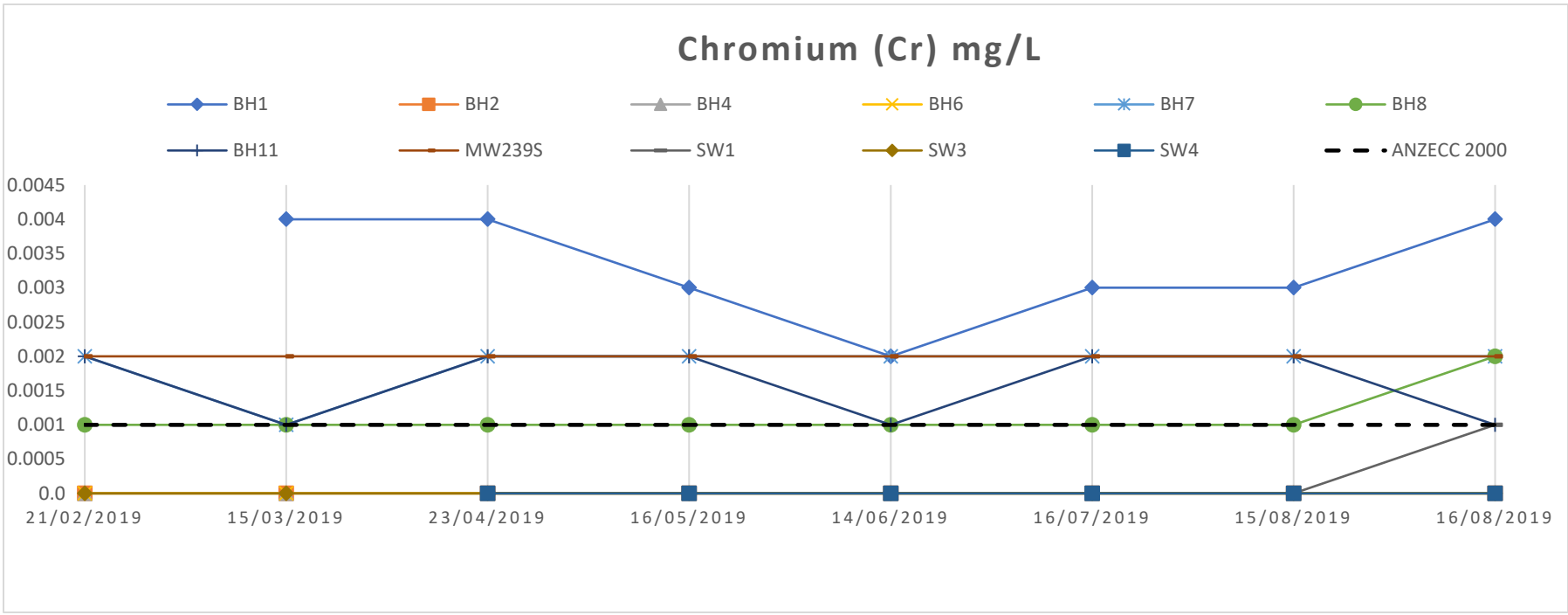

Groundwater Elevation (mAHD)
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
4
3.5
3
2.5
2
1.5
1
0.5
0
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
MW239S
MW239D

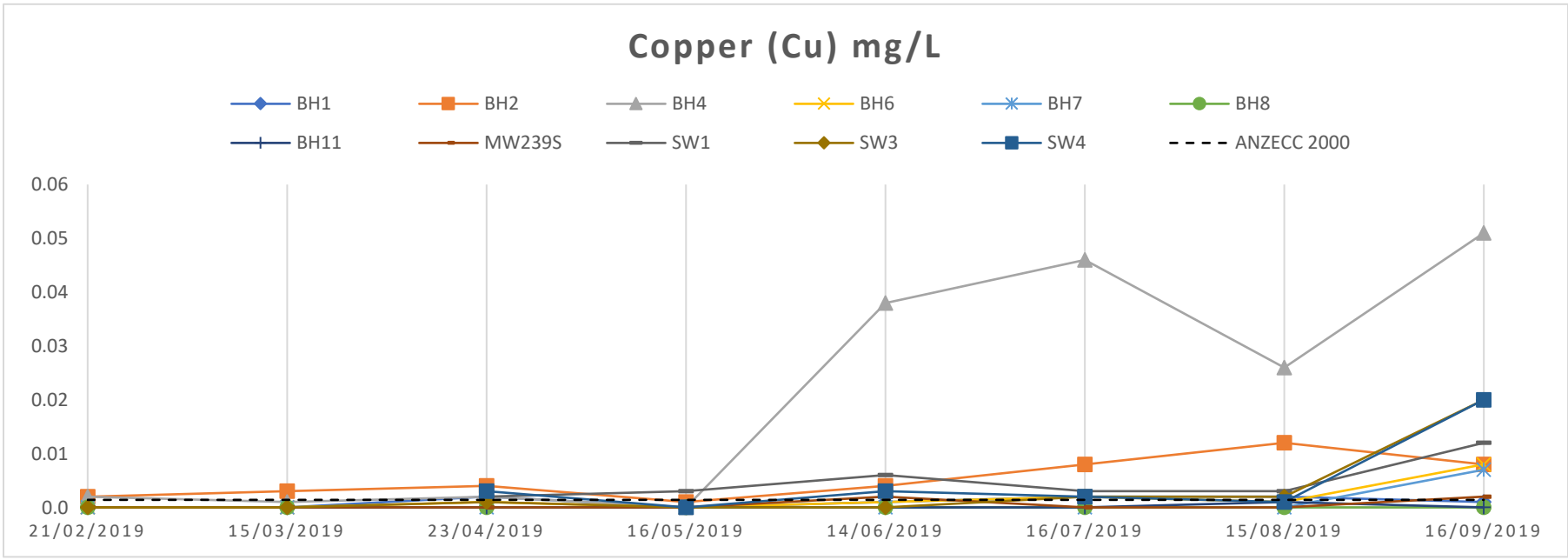

Field (EC) µS/cm
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019

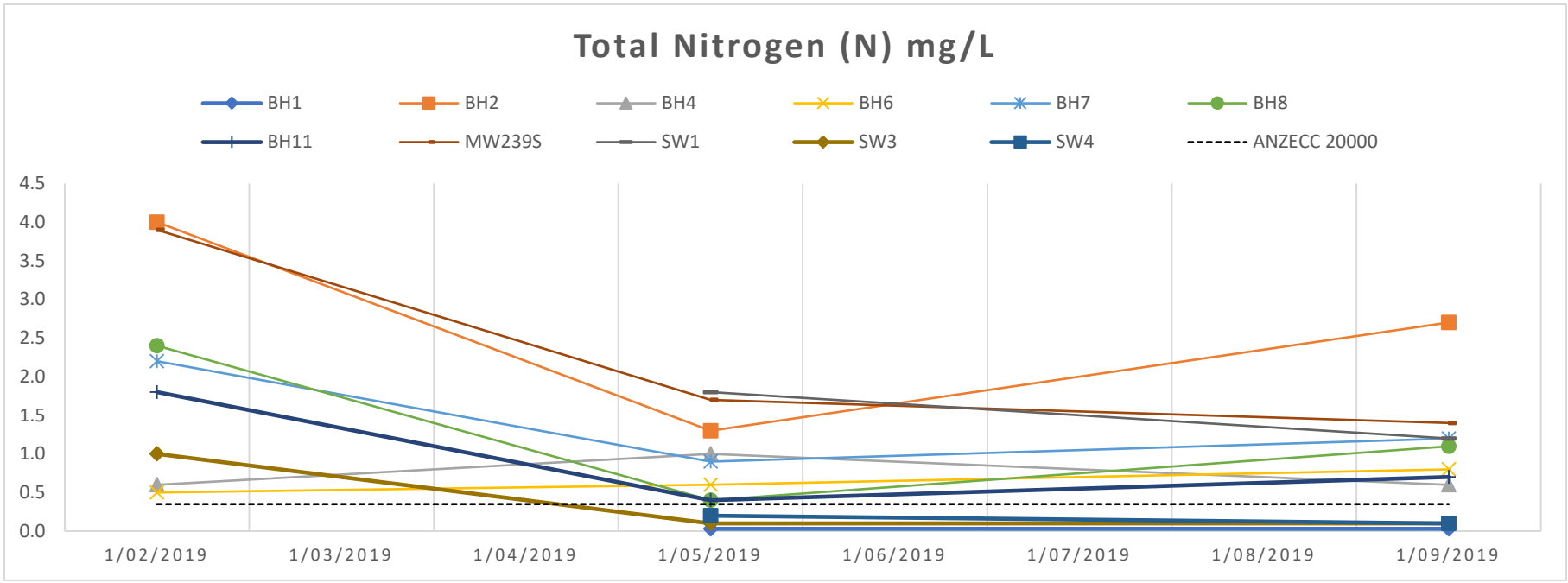

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8.0
6.0
4.0
2.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019

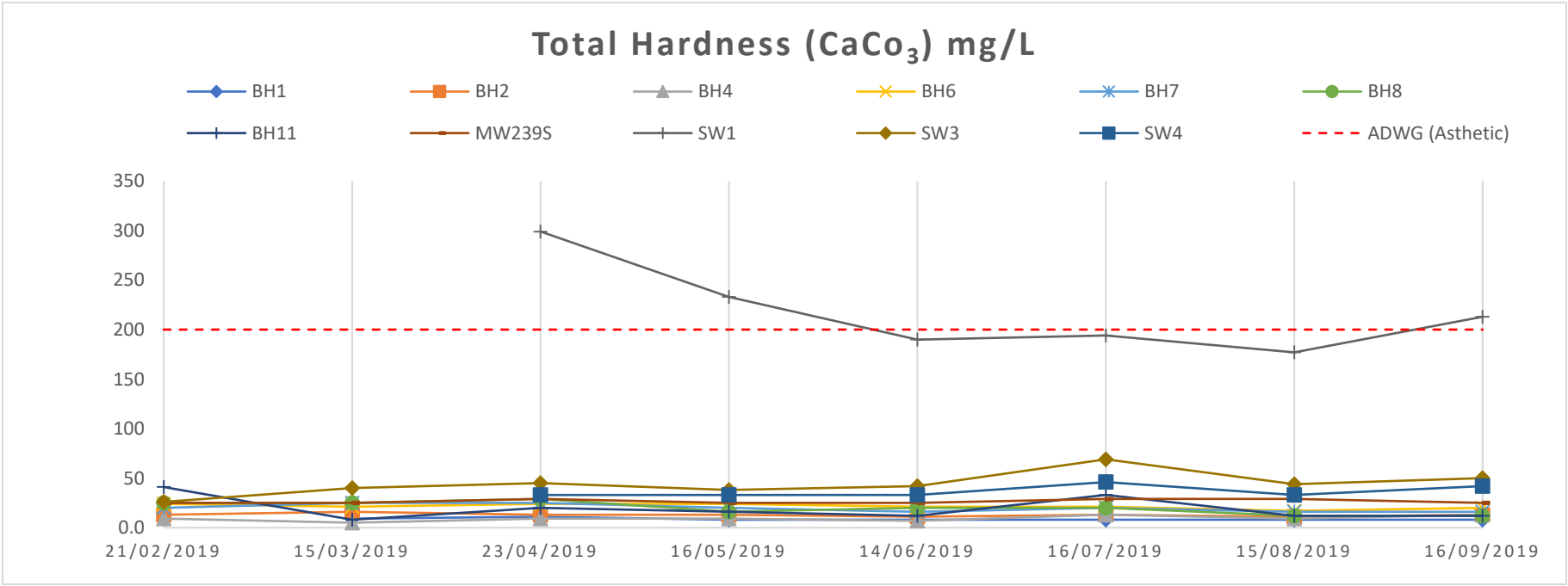

Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019

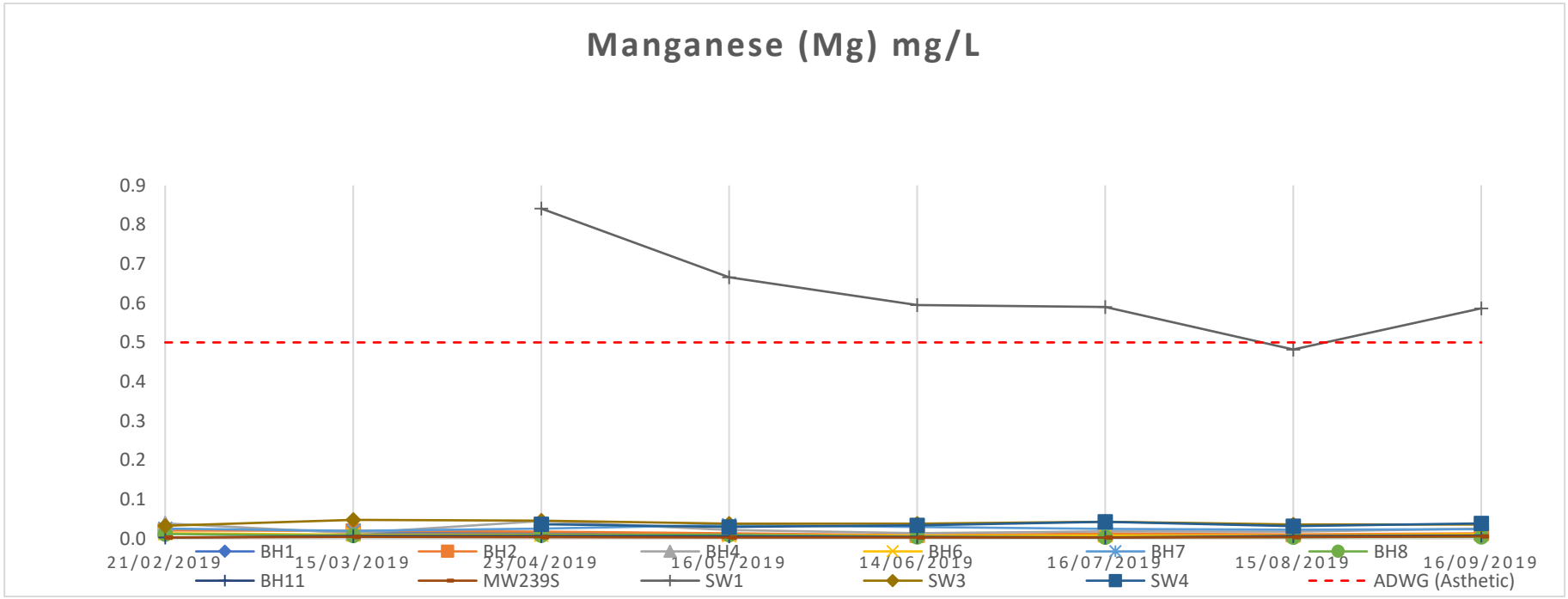

Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1.0
0.8
0.6
0.4
0.2
0.0
9/01/1900
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/08/2019

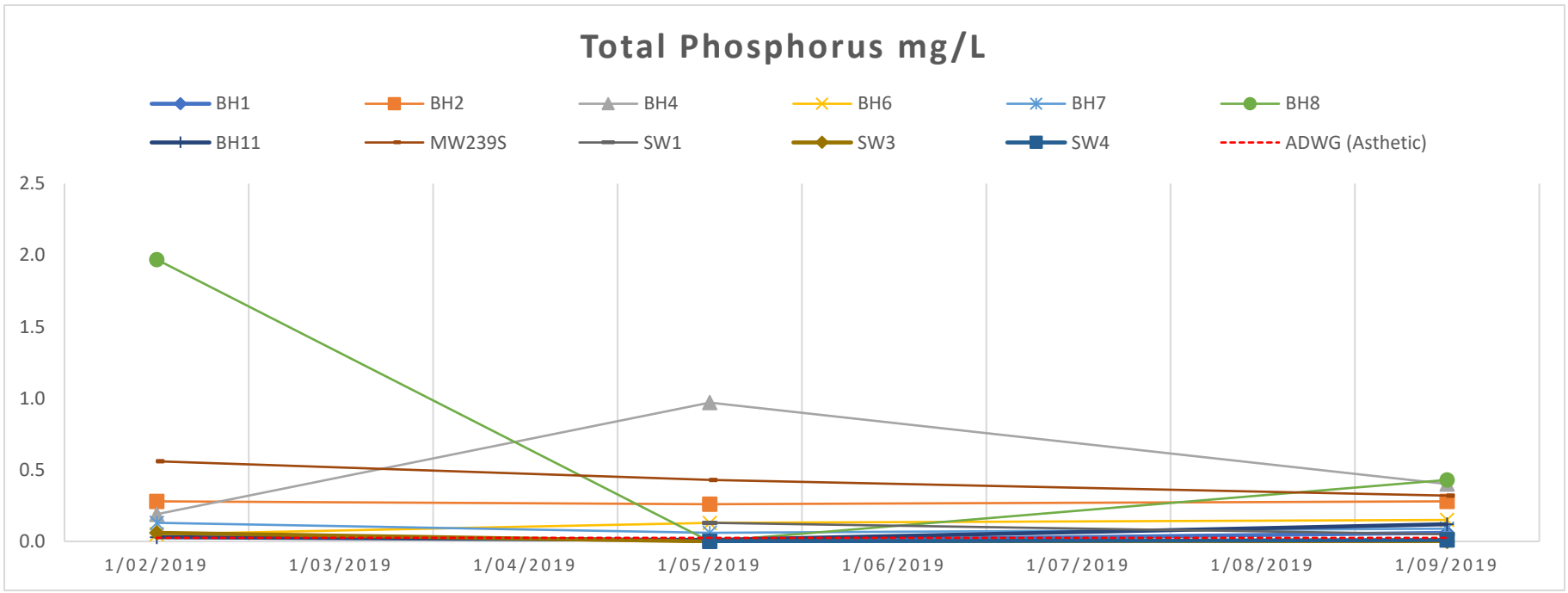

Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/08/2019

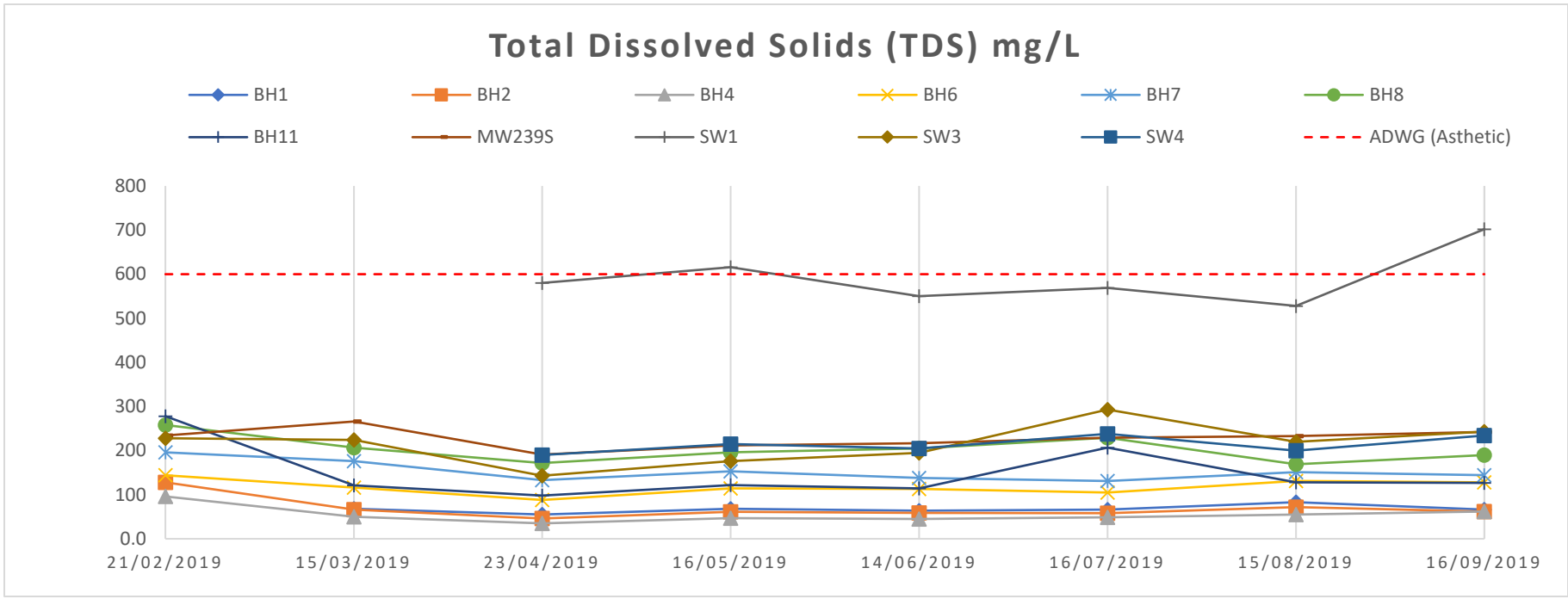

Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019


Total Nitrogen (N) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 20000
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/02/2019
1/03/2019
1/04/2019
1/05/2019
1/06/2019
1/07/2019
1/08/2019
1/09/2019


Total Hardness ($CaCo_3$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019


Manganese (Mg) mg/L
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)


Total Phosphorus mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
2.5
2.0
1.5
1.0
0.5
0.0
1/02/2019
1/03/2019
1/04/2019
1/05/2019
1/06/2019
1/07/2019
1/08/2019
1/09/2019


Total Dissolved Solids (TDS) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
800
700
600
500
400
300
200
100
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019

APPENDIX B9: OCTOBER 2019

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NEWCASTLE OFFICE

25 October 2019
Document Ref: NCA19R102873

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – October 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the October 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The October monitoring round was to include gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) including additional analytical parameters and sampling at four surface water locations.

2. SITE WORK

The monitoring round was conducted on 15 October 2019. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in trends as outlined in **Appendix B**.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The October 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 has now been decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	11	0	0	0	0
Hydrocarbons**	11	0	0	1	1
Metals***	11	0	0	1	1
Iron (dissolved)	11	0	0	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc').
** TRH (C6 – C40), BTEXN (Silica Gel)
*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn).

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.427	2.213	8.28	Slightly cloudy brown, no odour
BH2	7.79	5.769	2.021	9.03	Dark brown, slight sulfur odour
BH3					Well Decommissioned
BH4	3.06	1.531	1.529	6.11	Clear, no odour
BH5	7.36	5.767	1.593	8.8	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.628	1.992	4.62	Slight brown colour, slight sulfur odour
BH7	2.98	1.514	1.466	4.61	Slightly Cloudy, light brown, slight sulfur odour.
BH8	3.88	2.233	1.647	6.28	Dark brown cloudy, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.586	3.044	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.881	1.789	8.2	No sample taken.
MW239S	3.04	1.248	1.792	4.06	Cloudy Brown, Sulfur odour.
MW239D	3.04	1.226	1.814	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	0.29	2.79	N/A	Natural tannin stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.29	1.29	N/A	Water clear, no odour.
SW04*	N/A	0.35	2.35	N/A	Clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1140	21.12	18	5.5	78
BH02	1115	20.76	48	4.83	223
BH04	1030	19.18	8	4.93	221
BH06	1530	21.09	110	5.05	-144
BH07	1350	21.79	183	4.89	-139
BH08	1415	20.44	224	4.89	-160
BH11	1205	19.93	124	4.83	-117
MW239S	1300	20.87	331	4.81	-132
SW01	1045	16.56	857	4.35	339
SW03	1230	18.77	313	4.36	315
SW04	0945	16.45	325	4.36	370

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean rainfall totals, groundwater elevation (mAHD), field electrical conductivity (µs/cm), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness, manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium, potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	11	10	124	No	Similar
	Sulphate	1	11	2	127	No	Slight decrease in concentrations across all sites
	Chloride	1	11	18	191	No	Similar
	Fluoride	0.1	11	<0.1	0.6	No	Similar
	Reactive [3] Phosphorous	0.01	0				
	Total Phosphorous [3]	0.01	0				
	Nitrite [3]	0.01	0				
	Nitrate [3]	0.01	0				
	Ammonia [3]	0.01	0				
	Total Nitrogen [3]	0.1	0				
	Total Hardness	1	11	7.0	168	1 above NHMRC ADWG 6 aesthetics (SW1)	SW1 historically indicates concentrations exceeding or at criteria
	Total Dissolved Solids	1	11	55	528	No	SW1 indicates concentrations exceeding or at criteria
	pH	0.01	11	4.48	5.5	All outside ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.07	No	Similar
	Ba	0.001	11	0.004	0.037	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Cr	0.005-0.1	11	<0.001	0.003	4 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.005	No	Similar
	Cu	0.001	11	<0.001	0.011	10 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH4, BH7, BH9, BH11, MW238S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	11	0.31	4.32	All above NHMRC ADWG 6 aesthetics	General decrease in concentrations over time
	Mn	0.001	11	0.004	0.383	No	Similar
	Ni	0.001	11	<0.001	0.005	No	General decrease in concentrations following a spike in September 2019.
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	11	0.006	0.055	9 above ANZECC 2000 Trigger Values[2] (BH1, BH4, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	General decrease in concentrations following a spike in September 2019.
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Results compared to previous month have returned to Non-detect at all sample locations
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations
	PFDS	0.00001-0.0001	7	<0.00001	<0.00001	No	Results compared to previous month have returned to Non-detect at all sample locations

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was more rainfall in September than the mean leading up to the October monitoring event. October rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for October 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0		
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0		
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0		
4th	0	0	0	0	20.8	0.4	5.2	0	0	0		
5th	0	0	0	0	0.2	25	1.8	0.2	0	0		
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8		
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0		
8th	0	0	0	0	0	0	1.6	0	0	0		
9th	0	6.6	0	0	0	0	0.4	0	0	0.8		
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4		
11th	0	0	0	0	0.6	0	0	0	2.8	4		
12th	3.0	0	0	0	0	0	0	0	0	23		
13th	0	0	0	0	1.4	0	0	0	0	8.8		
14th	0	0	0	0.2	0	0	0	0	0	0		
15th	0	0	0	1.4	0	0	0	0	0			
16th	0	0	4.8	3.6	0	0	0	0	0			
17th	0	0	59.4	1.4	0	0	0	0	16.8			
18th	0	0	2.6	0.2	0	17.8	0	0	39.4			
19th	0	0	2.2	0.2	0	0	0	0	7.2			
20th	2.4		0	2.0	0	0	0	0	0			
21st	1.0	1.4	0	0.2	0	0	0	0	0			
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0			
23rd	0	1.4	0	0	0	20	0	0				
24th	0	9.2	5.4	0	0	50.6	0	0	0			
25th	0	0	5.2	0	0	15.2	2.0	0	0			
26th	0	0	0	0	0	1.8	0	0	0			
27th	0	0	0	0	0	0.8	0	0	0			
28th	1.0	0	0	0	0.8	0	0	0	0			
29th	0		0	0	0	0	0	0	0			
30th	0		38.2	0	0	0	0.6	21.2	0			
31st	0		6.6		0		10	67.4				
Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**98.6**	**75.4**	**44.8**		
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**73.2**	**60.6**	**73.9**	**82.3**	**78.6**

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

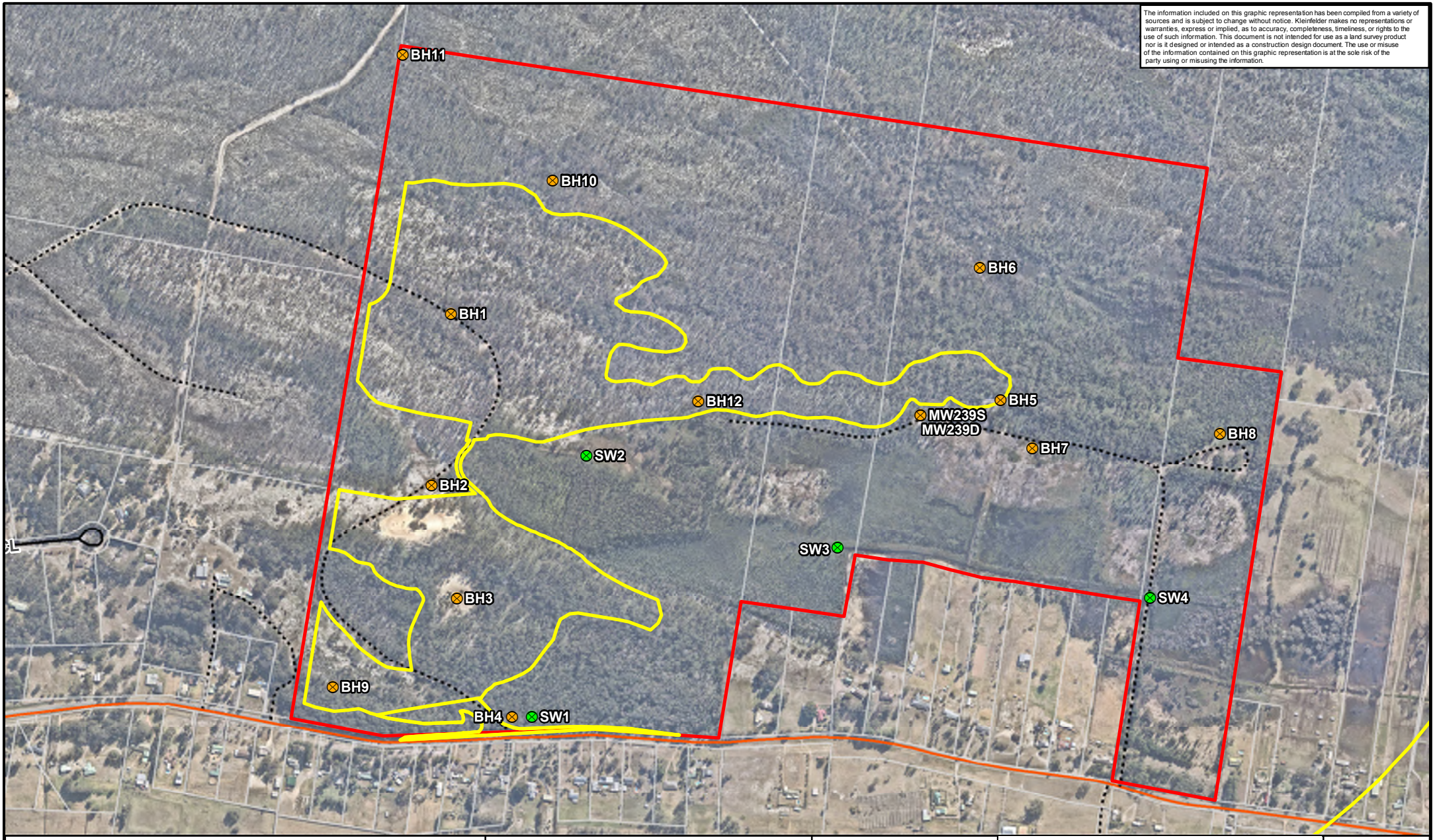
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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Bright People. Right Solutions.
www.kleinfelder.com

PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations October 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

KLEINFELDER
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Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons	
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16								
NHMRC ADWG 6		1	800	300	-	350	600									
Sample Name	Sample Date															
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Total Recoverable Hydrocarbons - Silcia Clean up				
$>C_{10}-C_{16}$ - Silica Cleanup	F2 - Silica Cleanup	$>C_{16}-C_{34}$ - Silica Cleanup	$>C_{34}-C_{40}$ - Silica Cleanup	$>C_{10}-C_{40}$ - Silica Cleanup
100	100	100	100	100
µg/L	µg/L	µg/L	µg/L	µg/L
< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	< 100	< 100

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

BH8	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	< 100	< 100

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.006**	**4.32**	< 0.001	**0.007**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.037**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.004**	**0.74**	< 0.001	**0.006**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.006**	**0.46**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
	15-Oct-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.011**	**0.31**	< 0.001	**0.136**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.014**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
	15-Oct-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.95**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.006**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.009**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	**0.003**	**1.32**	< 0.001	**0.018**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.011**

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	**0.002**	**2.08**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.003**	**0.68**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
	15-Oct-19	< 0.001	**0.036**	< 0.001	**0.07**	< 0.0001	< 0.001	**0.005**	**0.003**	**1.61**	< 0.001	**0.383**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.055**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
	15-Oct-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.005**	**0.002**	**1.7**	< 0.001	**0.027**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.022**
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.037**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.004**	**0.66**	< 0.001	**0.031**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.018**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids						
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56		
HEPA NEMP 2018***						0.00023						19		
HEPA NEMP 2018[4]												5.6		
Sample Name	Sample Date													
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	**0.02**	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
MW239S	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03 ***	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

				Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Su	
Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)
0.02	0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05

lfonic Acids		Sum of PFAS		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
0.05	0.05	0.01	0.01	0.01
µg/L	µg/L	µg/L	µg/L	µg/L
		0.07		
		0.7		
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	**0.02**
< 0.05	< 0.05	< 0.01	< 0.01	**0.02**
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	**0.03 ***	**0.01**	**0.01**
< 0.05	< 0.05	**0.05**	**0.05**	**0.05**

Analyte		Anions and Cations															Alkalinity					Inorganics			
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*			0.7**		0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5-8.5[3]
Sample Name	Sample Date																												
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-	-	14	< 1.0	< 1.0	14	8.0	128	83	82	5.22
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-	1.84	8.0	< 1.0	< 1.0	8.0	8.0	102	66	88	5.44
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71	-	-	4.0	< 1.0	< 1.0	4.0	8.0	98	64	-	5.5
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	12	195	127	140	4.66
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	194	126	-	4.92
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	96	62	60	4.72
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	102	66	-	5.06
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
	16-Sep-19	11	2.0	2.0	< 1.0	6.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	95	62	58	4.83
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	85	55	-	4.93
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	250	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	0.2	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.76
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-	2.44	2.0	< 1.0	< 1.0	2.0	20	197	128	124	4.68
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	202	131	-	5.17
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.51
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.88	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-	-	8.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-	2.79	5.0	< 1.0	< 1.0	5.0	16	222	144	181	5.07
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	252	164	-	4.95
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	259	-	4.46
	14-Mar-19	45	< 1.0	6.0	1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	6.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06	-	5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	-	2.29	2.06	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	303	197	-	5.02
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	224	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	419	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	< 1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69	-	4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
	15-Oct-19	58	< 1.0	6.0	< 1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	-	3.02	3.21	3.15	-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	6.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	5.38	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	-	8.82	8.03	4.68	-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61	-	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
	15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	-	2.56	2.48	-	-	< 1.0	< 1.0	< 1.0	< 1.0	41	383	249	-	4.75
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44	2.52	-	3.1	< 1.0	< 1.0	< 1.0	< 1.0	33	331	215	288	4.08
	14-Jun-19	40	5.0	5.0	< 1.0	39	60	< 0.1	-	-	-	-	-	-	-	-	2.4	2.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	316	205	163	4.31
	16-Jul-19	46	7.0	7.0	< 1.0	67	56	0.2	-	-	-	-	-	-	-	-	2.93	2.97	-	-	< 1.0	< 1.0	< 1.0	< 1.0	46	367	238	207	4.46
	15-Aug-19	40	5.0	5.0	< 1.0	43	55	0.1	-	-	-	-	-	-	-	-	2.4	2.45	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	308	200	160	4.48
	16-Sep-19	45	7.0	6.0	< 1.0	45	58	0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.8	2.57	-	3.01	< 1.0	< 1.0	< 1.0	< 1.0	42	360	234	208	4.35
	15-Oct-19	44	6.0	6.0	< 1.0	38	57	0.1	-	-	-	-	-	-	-	-	2.71	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	40	365	237	-	4.48

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type									
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Total Petroleum Hydrocarbons				Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable		
C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 100	< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	-	-	-	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 100	< 100	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
< 50	< 100	< 50	< 50	-	-	-	-	< 20	< 20	< 100
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
200	400	200	800	< 50	< 100	< 100	< 400	< 20	< 20	180
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-
-	-	-	-	< 50	< 100	< 50	< 50	< 20	< 20	-

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

e Hydrocarbons			Total Recoverable Hydrocarbons - Silcia Clean up				
$>C_{10} - C_{16}$ minus Naphthalene (F2)	$>C_{16} - C_{34}$	$>C_{34} - C_{40}$	$>C_{10}-C_{16}$ - Silica Cleanup	F2 - Silica Cleanup	$>C_{16}-C_{34}$ - Silica Cleanup	$>C_{34}-C_{40}$ - Silica Cleanup	$>C_{10}-C_{40}$ - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
			-	-	-	-	-
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			< 100	< 100	< 100	< 100	< 100
			NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 100	-	-	-	-	-
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	-	< 100	< 100	< 100	< 100	< 100

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluorosulfonic Acids						Perfluorocarboxylic Acids												Perfluoroalkyl Sulfonamides						(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type																														
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP02_140319	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK DS_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	0%	0%
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.05	< 0.1
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	**100%**	**86%**	**133%**
TRIP BLANK 09_19031969	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
RINSATE 09_19031969	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1933705**	Page	: 1 of 19
Amendment	: **1**		
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown Sand Syndicate	Date Samples Received	: 15-Oct-2019 15:37
Order number	: 20193820	Date Analysis Commenced	: 16-Oct-2019
C-O-C number	: 4787	Issue Date	: 23-Oct-2019 10:26
Sampler	: DANIEL KOUSBROEK		
Site	: Williamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 13		
No. of samples analysed	: 13		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES1933475 #1. Confirmed by re-analysis.
- Amendment (23/10/2019): This report has been amended and re-released to allow the reporting of additional analytical data.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit		ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.50	5.06	4.93	5.17	4.95
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		98	102	85	202	252
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		64	66	55	131	164
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	13	7	21	20
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		4	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		4	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	5	4	13	12
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		21	20	18	41	53
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	1	2	<1
Magnesium	7439-95-4	1	mg/L		2	2	1	4	5
Sodium	7440-23-5	1	mg/L		13	12	10	25	34
Potassium	7440-09-7	1	mg/L		<1	<1	<1	1	2
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.005	0.004	0.010	0.026	0.009
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.003	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.006	0.006	0.011	<0.001	0.003
Manganese	7439-96-5	0.001	mg/L		0.007	0.011	0.136	0.009	0.018
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.002	<0.001	0.003
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit		ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.037**	**0.007**	**0.014**	**0.006**	**0.011**
Iron	7439-89-6	0.05	mg/L		**4.32**	**0.46**	**0.31**	**1.95**	**1.32**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.71**	**0.67**	**0.59**	**1.43**	**1.74**
ø Total Cations	----	0.01	meq/L		**0.73**	**0.79**	**0.57**	**1.54**	**1.94**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit		ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH1	BH2	BH4	BH6	BH7
				Client sampling date / time	15-Oct-2019 11:37	15-Oct-2019 11:07	15-Oct-2019 10:18	15-Oct-2019 13:31	15-Oct-2019 13:48
Compound	CAS Number	LOR	Unit		ES1933705-005	ES1933705-006	ES1933705-007	ES1933705-008	ES1933705-009
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**107**	**119**	**115**	**115**	**116**
Toluene-D8	2037-26-5	2	%		**105**	**98.7**	**101**	**108**	**97.5**
4-Bromofluorobenzene	460-00-4	2	%		**101**	**102**	**100**	**104**	**96.8**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	**114**	**112**	**112**
13C8-PFOA	----	0.02	%		----	----	**118**	**119**	**116**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH8	BH11	MW239S	----	----
			Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit	ES1933705-010	ES1933705-013	ES1933705-014	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.02**	**4.92**	**4.86**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**303**	**194**	**404**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**197**	**126**	**263**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**16**	**12**	**25**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**4**	**3**	**8**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**70**	**44**	**108**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L	**4**	**3**	**6**	----	----
Sodium	7440-23-5	1	mg/L	**45**	**28**	**58**	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	**0.007**	**0.004**	**0.005**	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.001**	**0.002**	**0.002**	----	----
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.004**	**0.003**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.009**	**0.006**	**0.004**	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.003**	**0.002**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	----	----
				Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit		ES1933705-010	ES1933705-013	ES1933705-014	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.011**	**0.016**	**0.011**	----	----
Iron	7439-89-6	0.05	mg/L		**2.08**	**0.74**	**0.68**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.06**	**1.30**	**3.21**	----	----
ø Total Cations	----	0.01	meq/L		**2.29**	**1.46**	**3.02**	----	----
ø Ionic Balance	----	0.01	%		**----**	**----**	**3.15**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	----	----
				Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit		ES1933705-010	ES1933705-013	ES1933705-014	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	----	----
				Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit		ES1933705-010	ES1933705-013	ES1933705-014	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**126**	**120**	**117**	----	----
Toluene-D8	2037-26-5	2	%		**107**	**98.4**	**96.5**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**108**	**99.6**	**95.3**	----	----
EP231S: PFAS Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH8	BH11	MW239S	----	----
				Client sampling date / time	15-Oct-2019 14:02	15-Oct-2019 12:04	15-Oct-2019 13:08	----	----
Compound	CAS Number	LOR	Unit		ES1933705-010	ES1933705-013	ES1933705-014	--------	--------
					Result	Result	Result	----	----
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		**111**	----	----	----	----
13C8-PFOA	----	0.02	%		**116**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW1	SW3	SW4	----	----
				Client sampling date / time	15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit		ES1933705-001	ES1933705-003	ES1933705-004	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		5.32	4.75	4.48	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		1050	383	365	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		682	249	237	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		168	41	40	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		127	42	38	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		191	57	57	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		16	5	6	----	----
Magnesium	7439-95-4	1	mg/L		31	7	6	----	----
Sodium	7440-23-5	1	mg/L		124	40	44	----	----
Potassium	7440-09-7	1	mg/L		3	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		0.07	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		0.036	0.034	0.037	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		0.005	0.005	0.002	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		0.003	0.002	0.004	----	----
Manganese	7439-96-5	0.001	mg/L		0.383	0.027	0.031	----	----
Nickel	7440-02-0	0.001	mg/L		0.005	0.005	0.003	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW1	SW3	SW4	----	----
				Client sampling date / time	15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit		ES1933705-001	ES1933705-003	ES1933705-004	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.055**	**0.022**	**0.018**	----	----
Iron	7439-89-6	0.05	mg/L		**1.61**	**1.70**	**0.66**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.6**	**0.2**	**0.1**	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**8.03**	**2.48**	**2.40**	----	----
ø Total Cations	----	0.01	meq/L		**8.82**	**2.56**	**2.71**	----	----
ø Ionic Balance	----	0.01	%		**4.68**	**----**	**----**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW1	SW3	SW4	----	----
				Client sampling date / time	15-Oct-2019 10:51	15-Oct-2019 12:36	15-Oct-2019 09:41	----	----
Compound	CAS Number	LOR	Unit		ES1933705-001	ES1933705-003	ES1933705-004	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**111**	**111**	**109**	----	----
Toluene-D8	2037-26-5	2	%		**108**	**97.4**	**101**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**107**	**102**	**97.6**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
			Client sampling date / time	15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	--------	--------	--------
				Result	Result	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
			Client sampling date / time	15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit	ES1933705-015	ES1933705-016	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
				Client sampling date / time	15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit		ES1933705-015	ES1933705-016	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Rinsate09 Glove Rinsate	Trip Blank 09 Trip Blank	----	----	----
				Client sampling date / time	15-Oct-2019 14:29	15-Oct-2019 14:32	----	----	----
Compound	CAS Number	LOR	Unit		ES1933705-015	ES1933705-016	--------	--------	--------
					Result	Result	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**120**	**116**	----	----	----
Toluene-D8	2037-26-5	2	%		**95.1**	**95.6**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**96.5**	**94.5**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**108**	**113**	----	----	----
13C8-PFOA	----	0.02	%		**117**	**119**	----	----	----

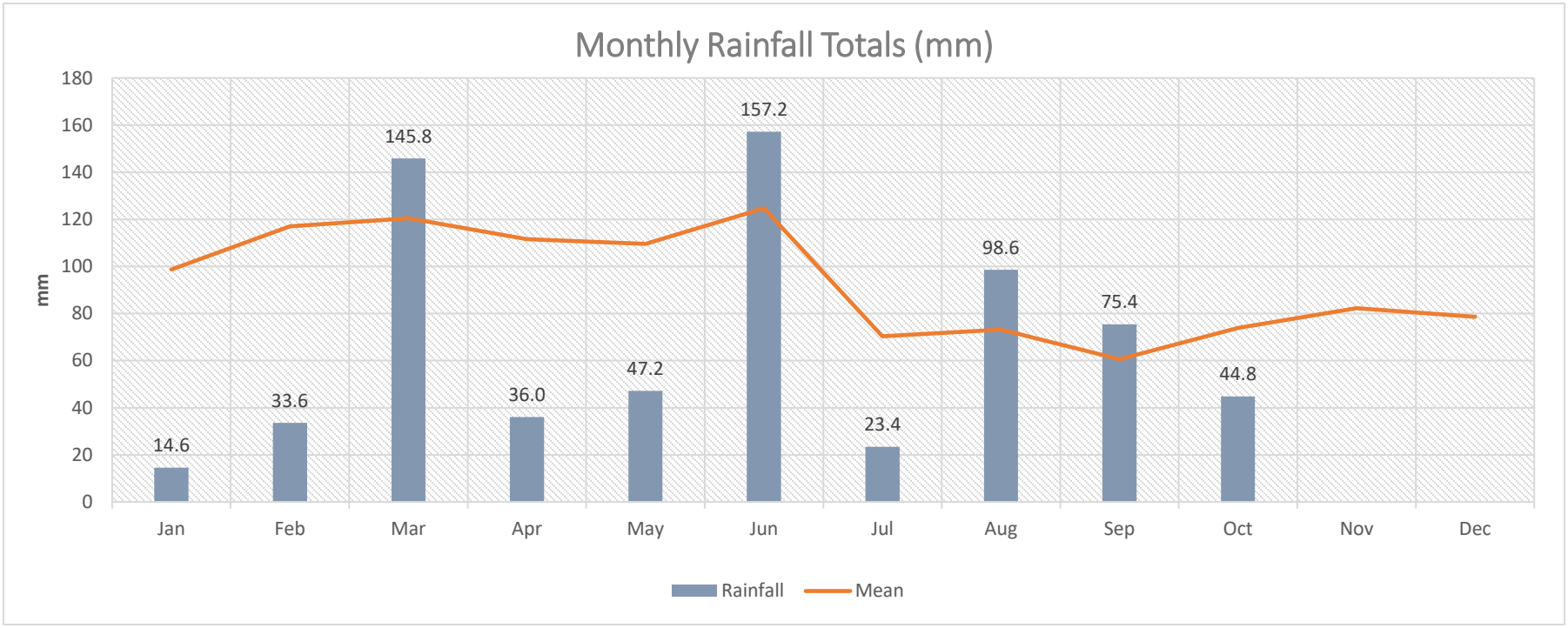
Surrogate Control Limits

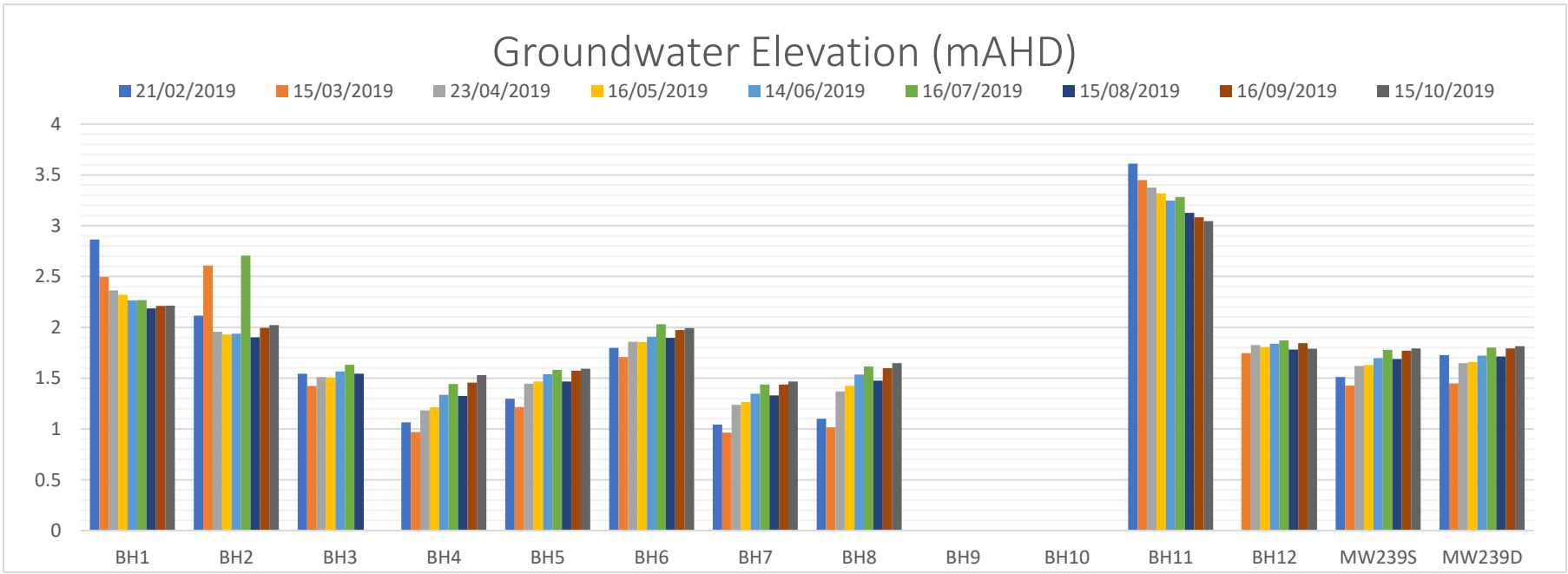
Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

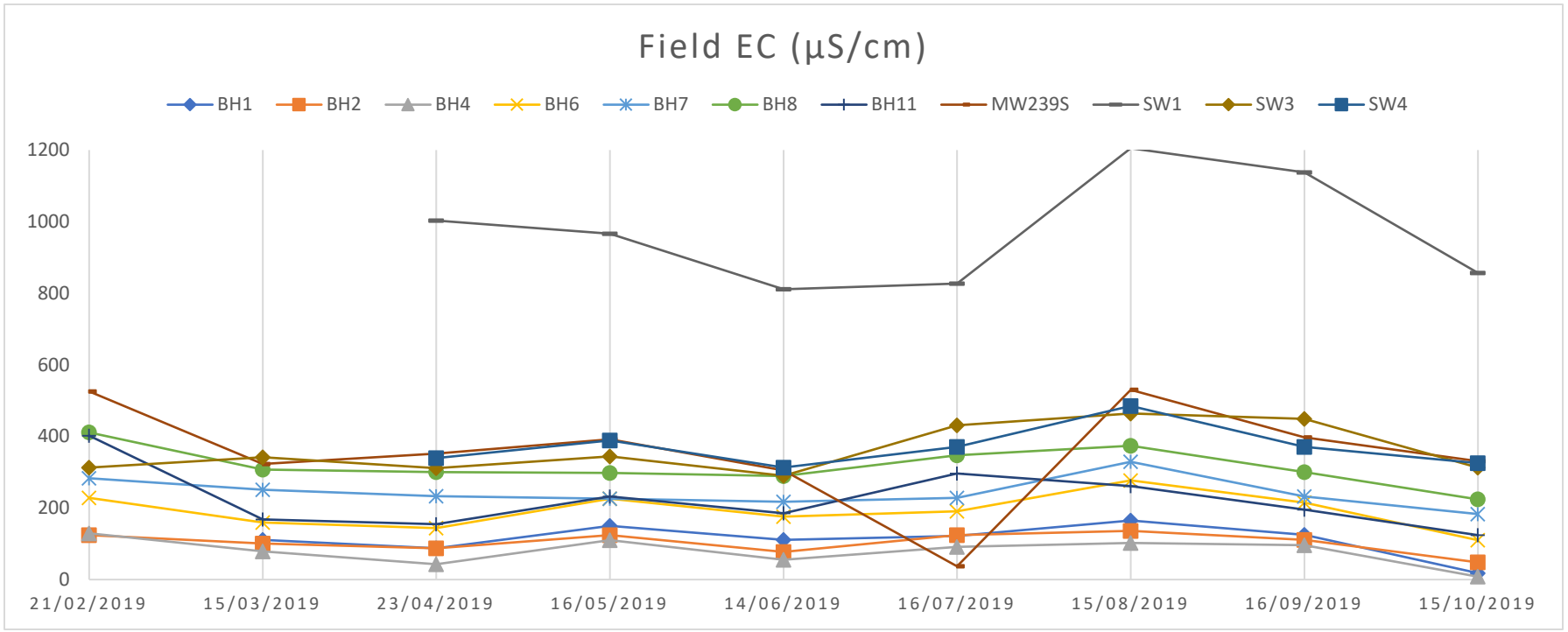
Sub-Matrix: **SURFACE WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

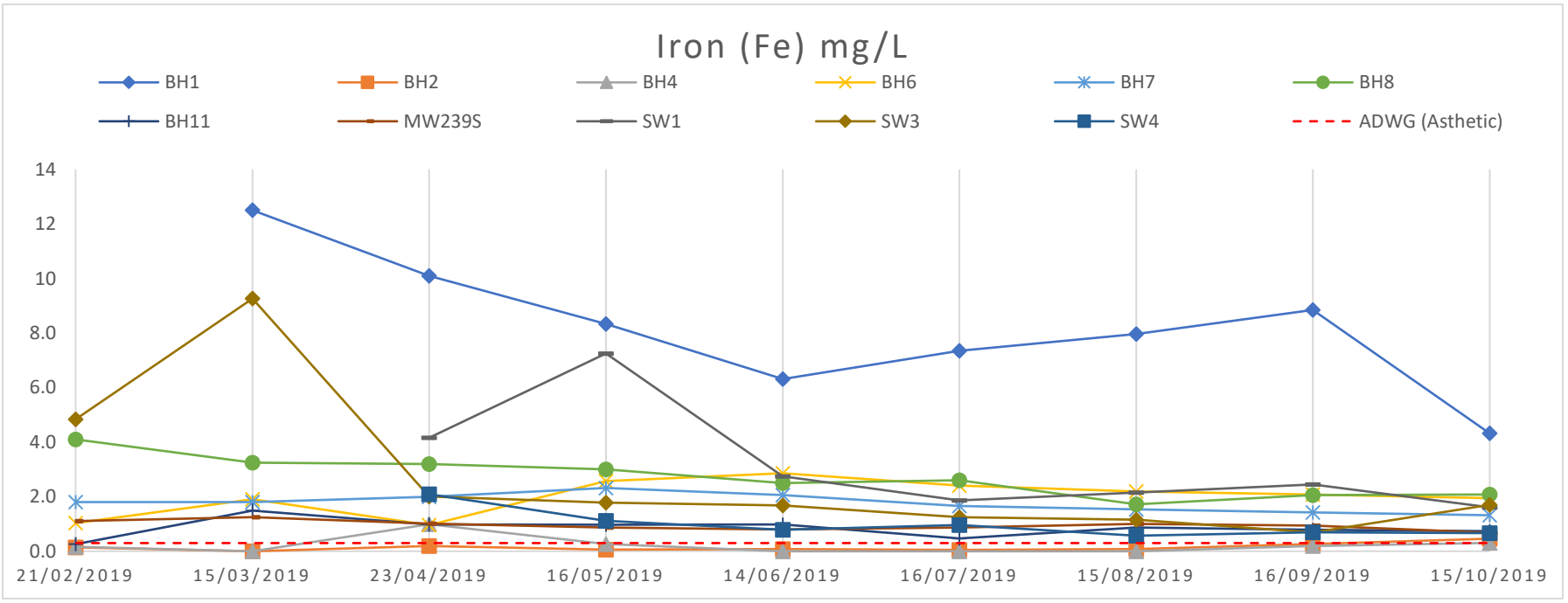
Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

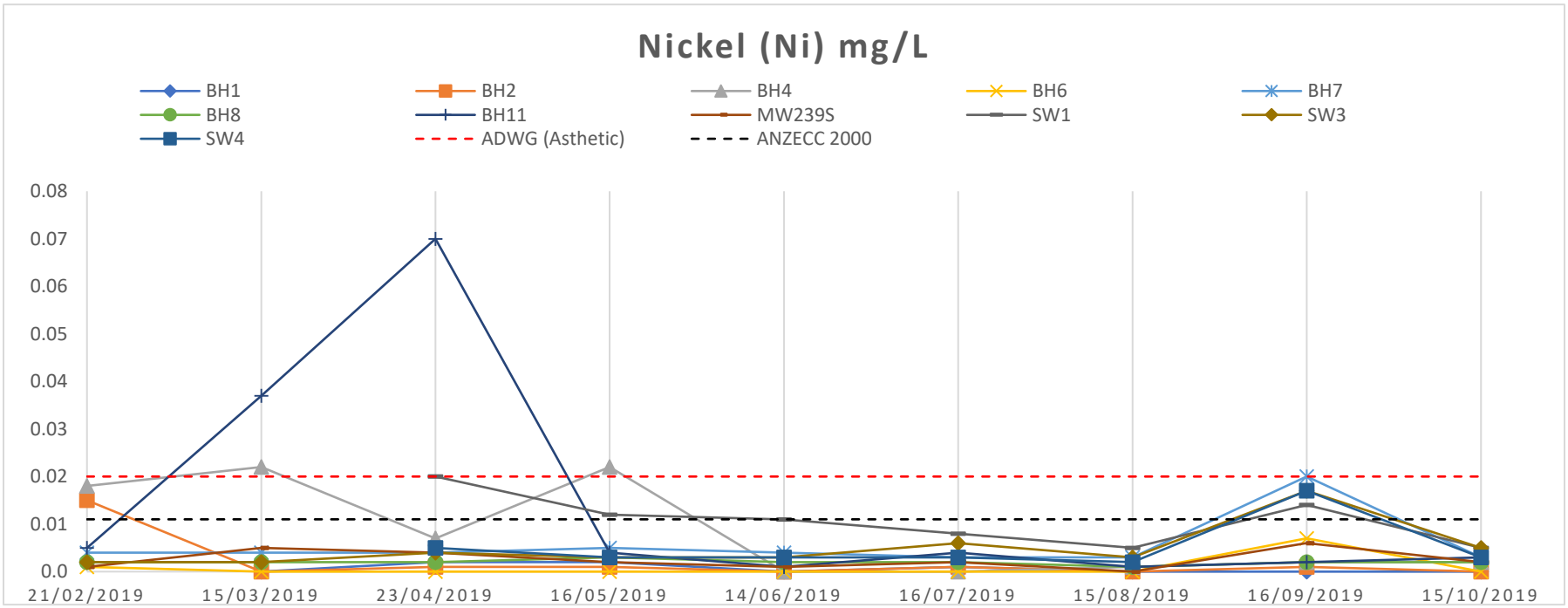
ATTACHMENT B: TREND DATA

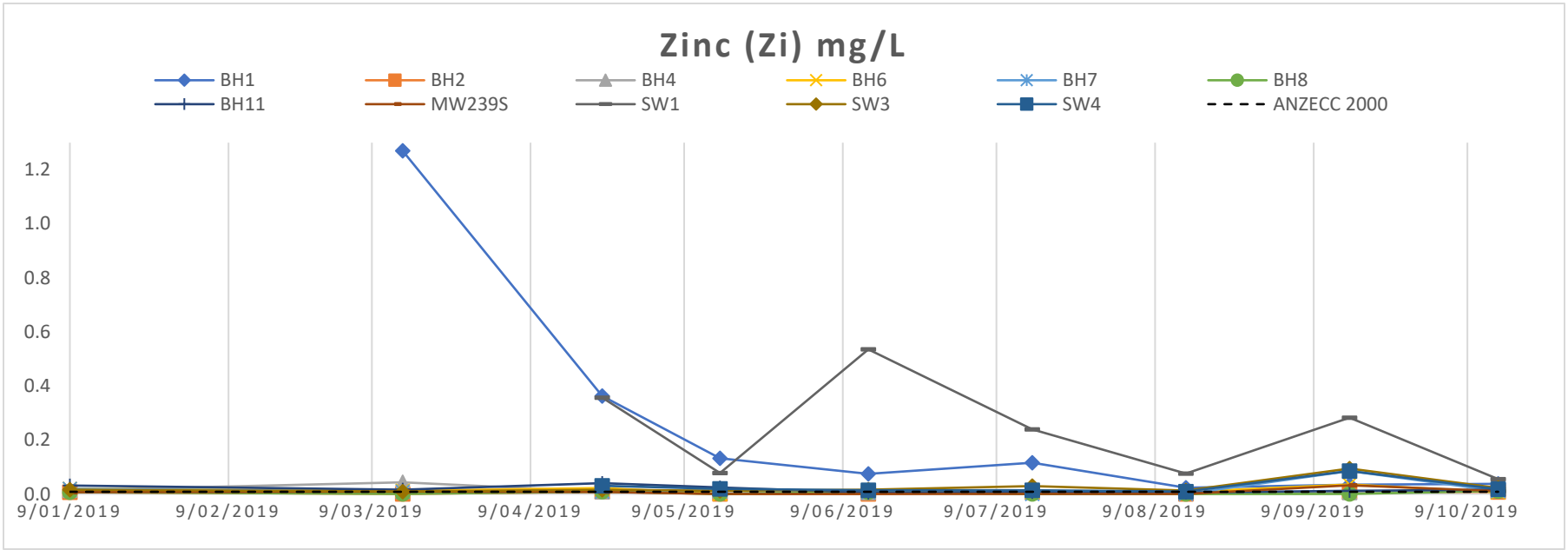

Monthly Rainfall Totals (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
44.8
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Rainfall
Mean

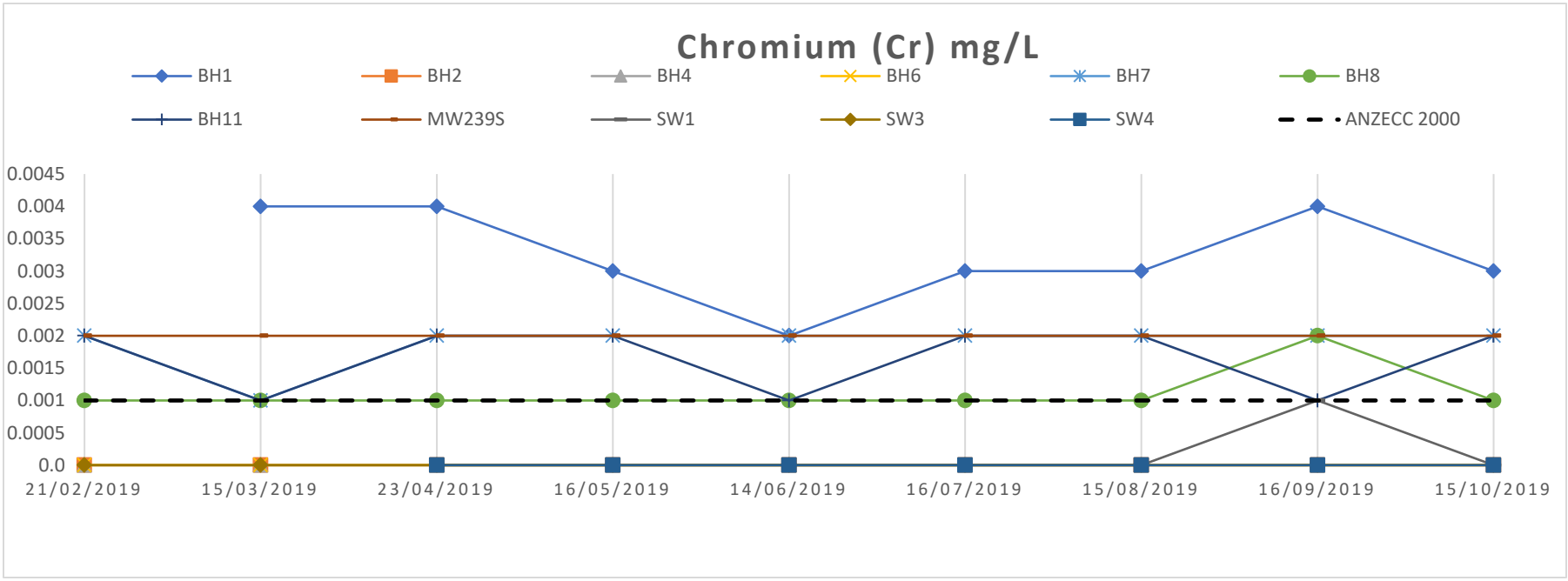

Groundwater Elevation (mAHD)
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
4
3.5
3
2.5
2
1.5
1
0.5
0
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
MW239S
MW239D

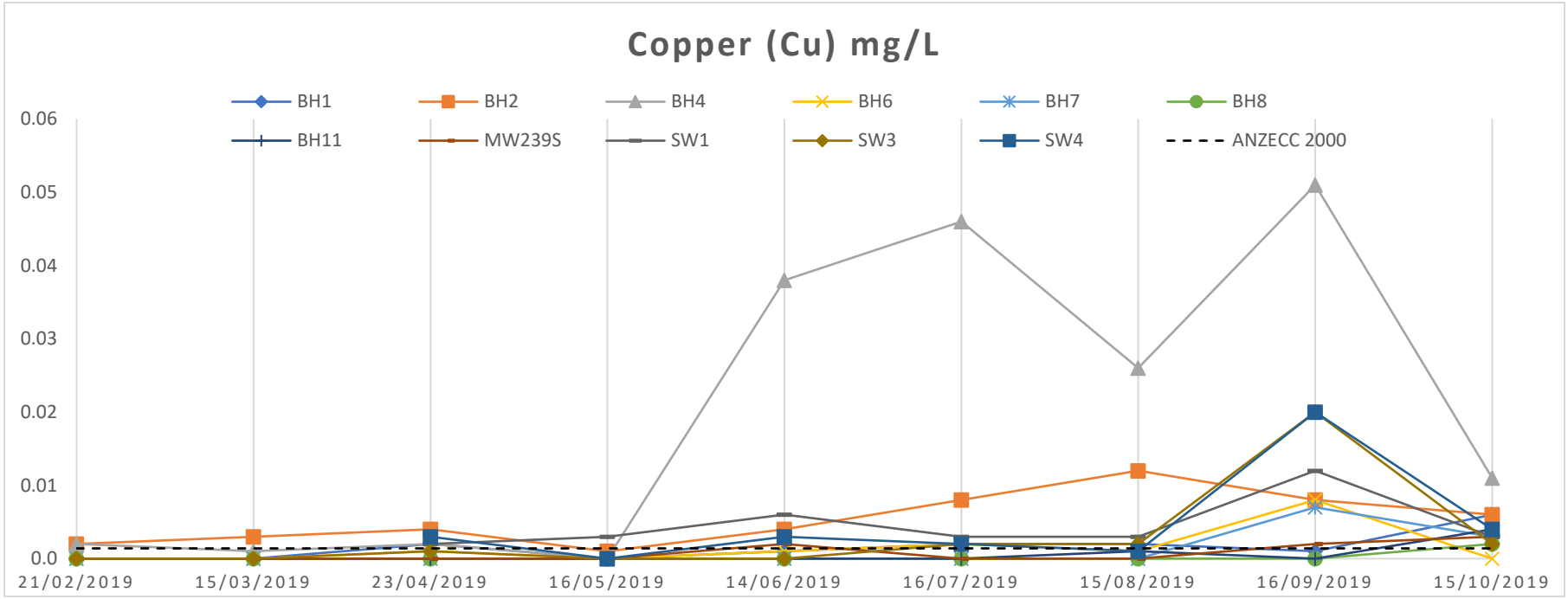

Field EC (µS/cm)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

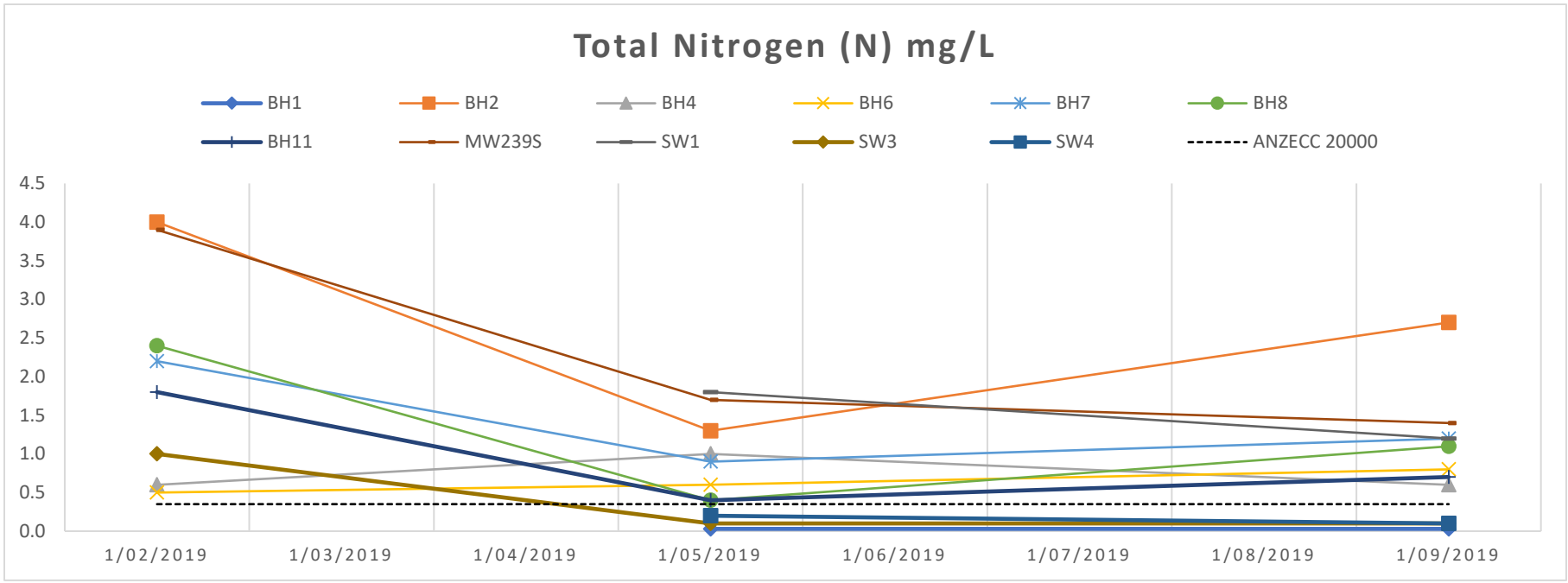

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8.0
6.0
4.0
2.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

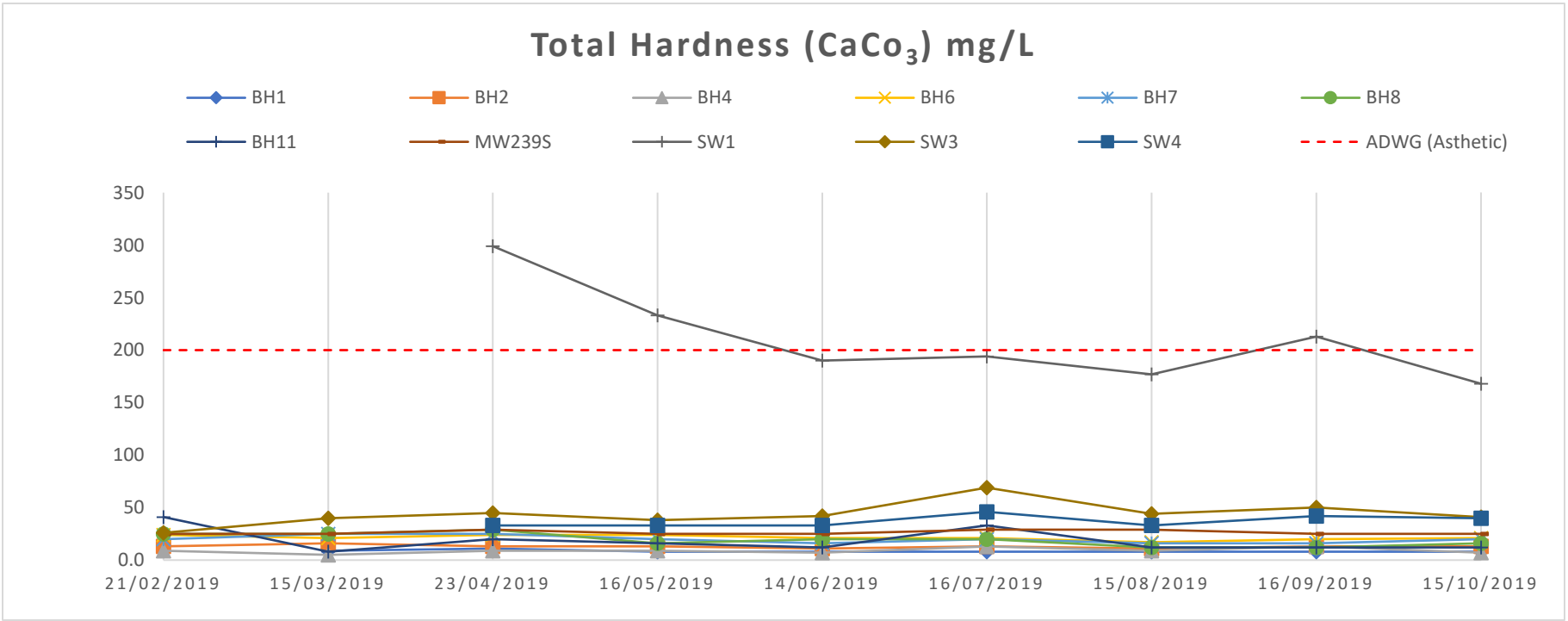

Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

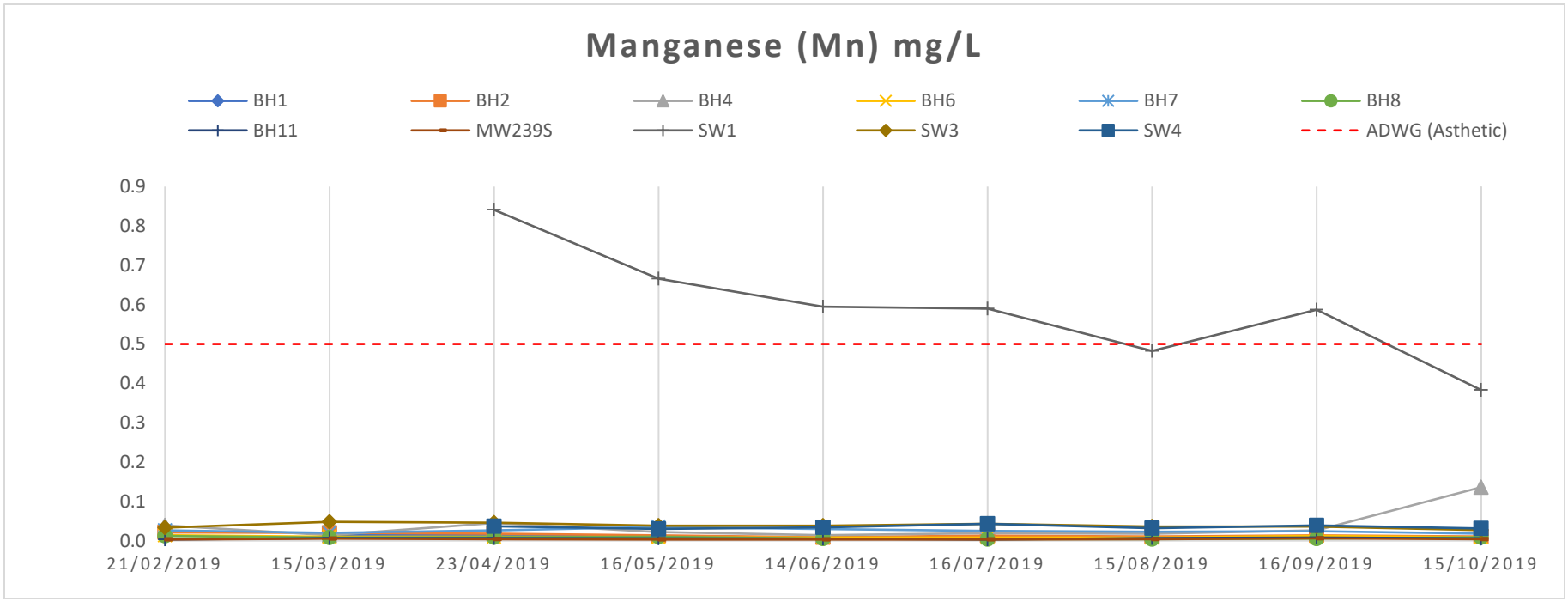

Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1.0
0.8
0.6
0.4
0.2
0.0
9/01/2019
9/02/2019
9/03/2019
9/04/2019
9/05/2019
9/06/2019
9/07/2019
9/08/2019
9/09/2019
9/10/2019

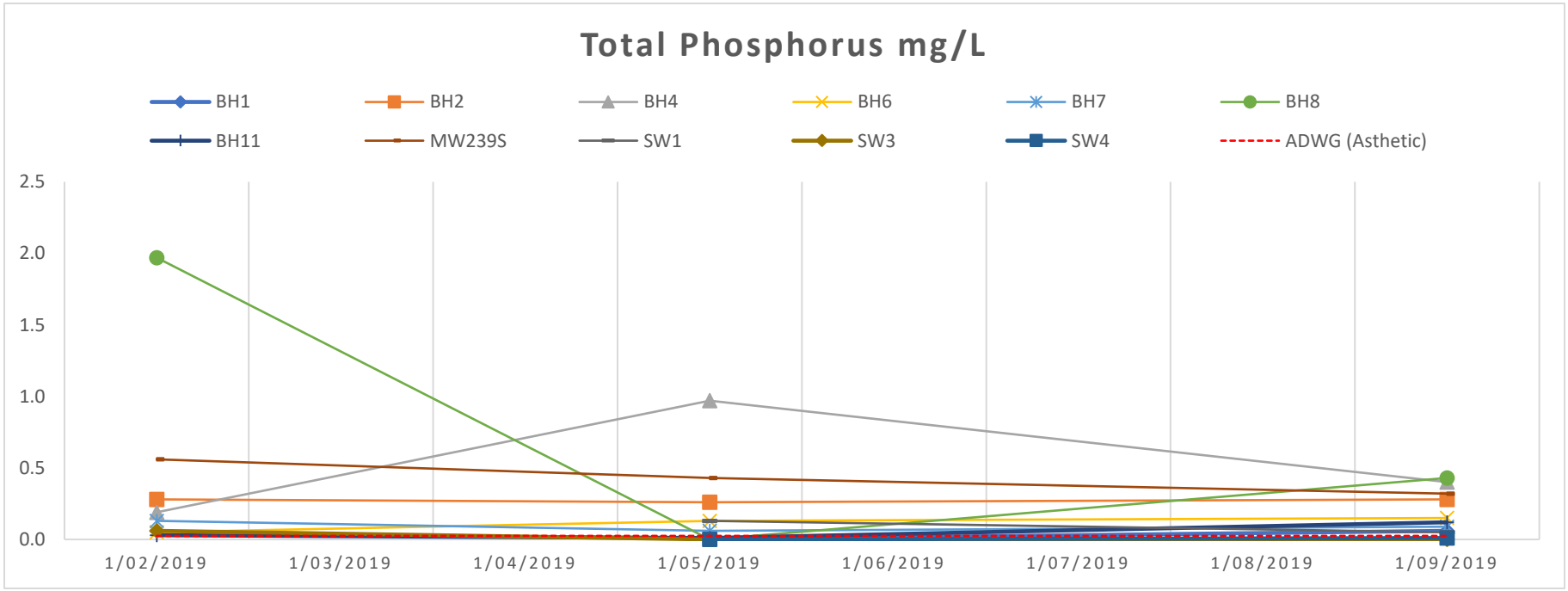

Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

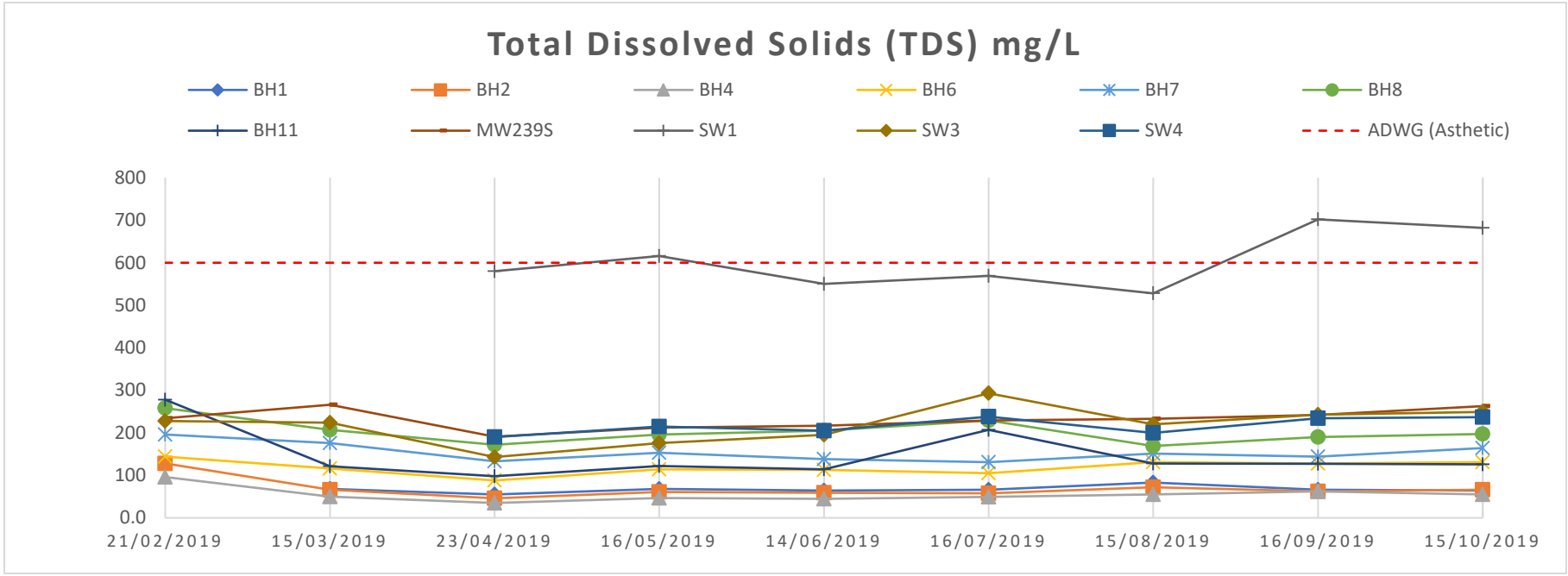

Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

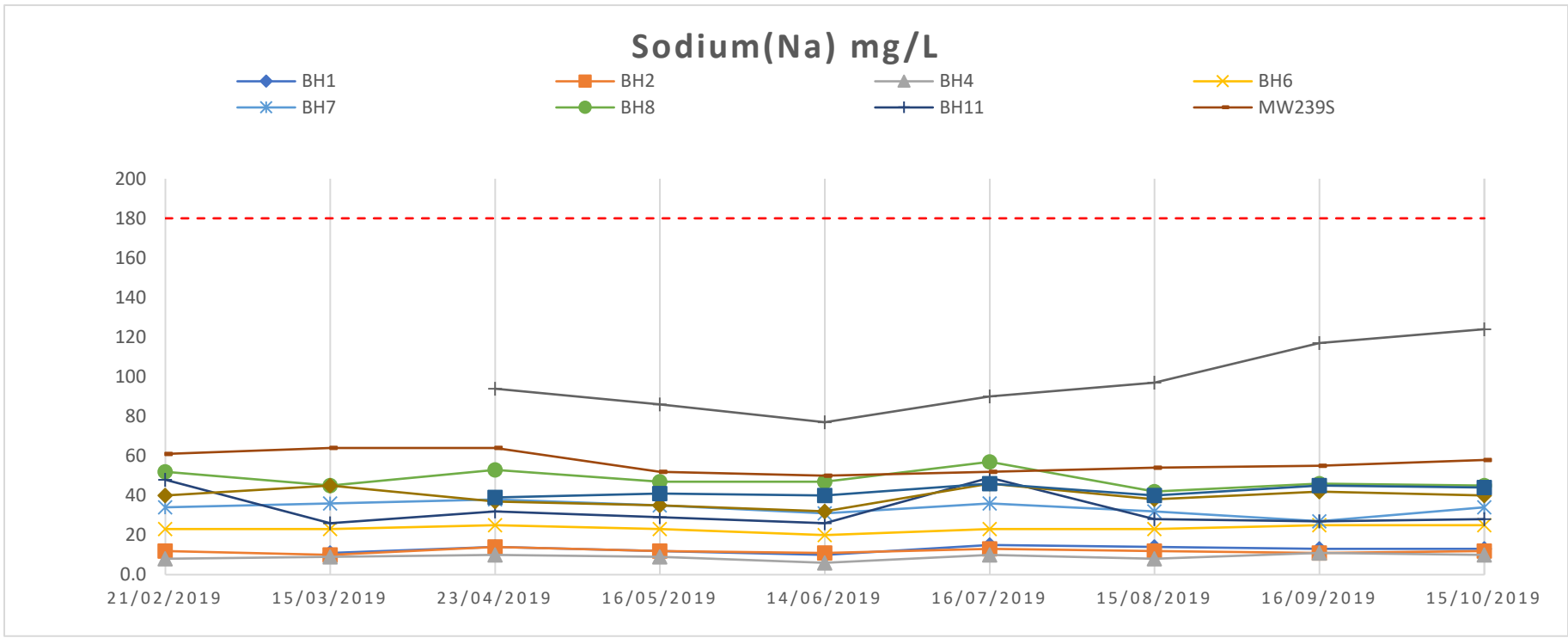

Total Nitrogen (N) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 20000
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/02/2019
1/03/2019
1/04/2019
1/05/2019
1/06/2019
1/07/2019
1/08/2019
1/09/2019

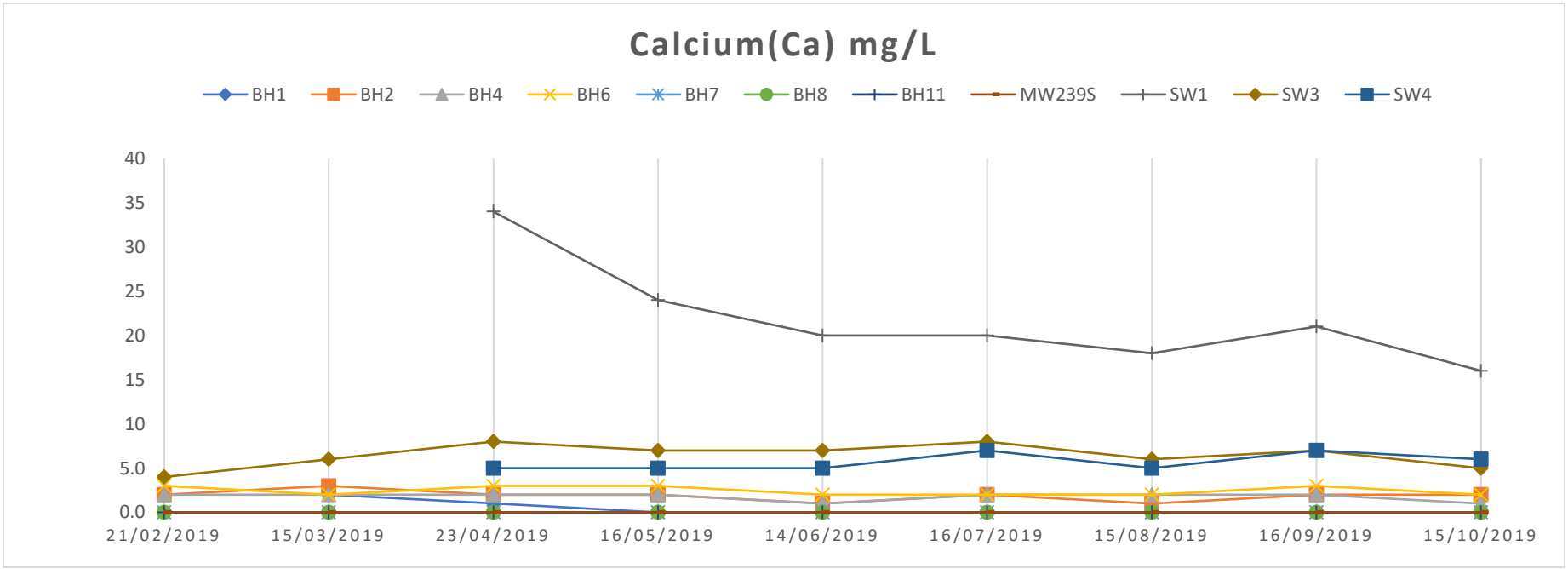

Total Hardness ($CaCo_3$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

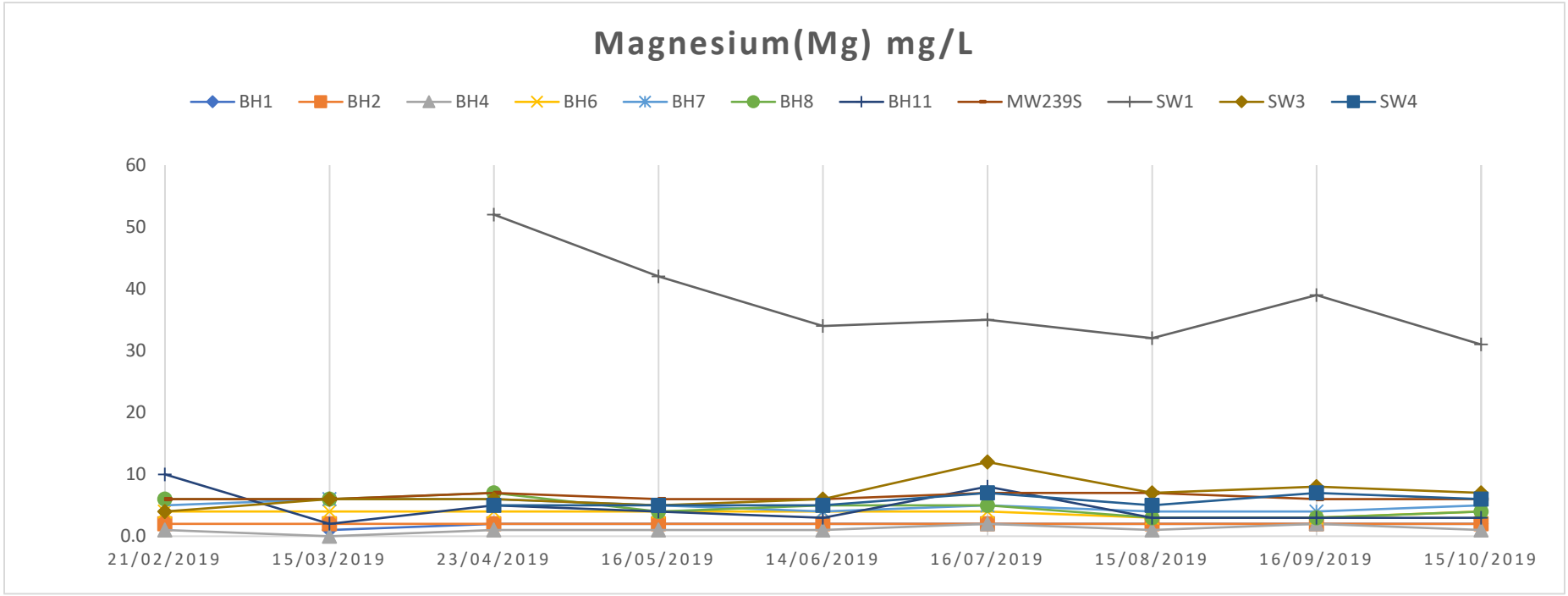

Manganese (Mn) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

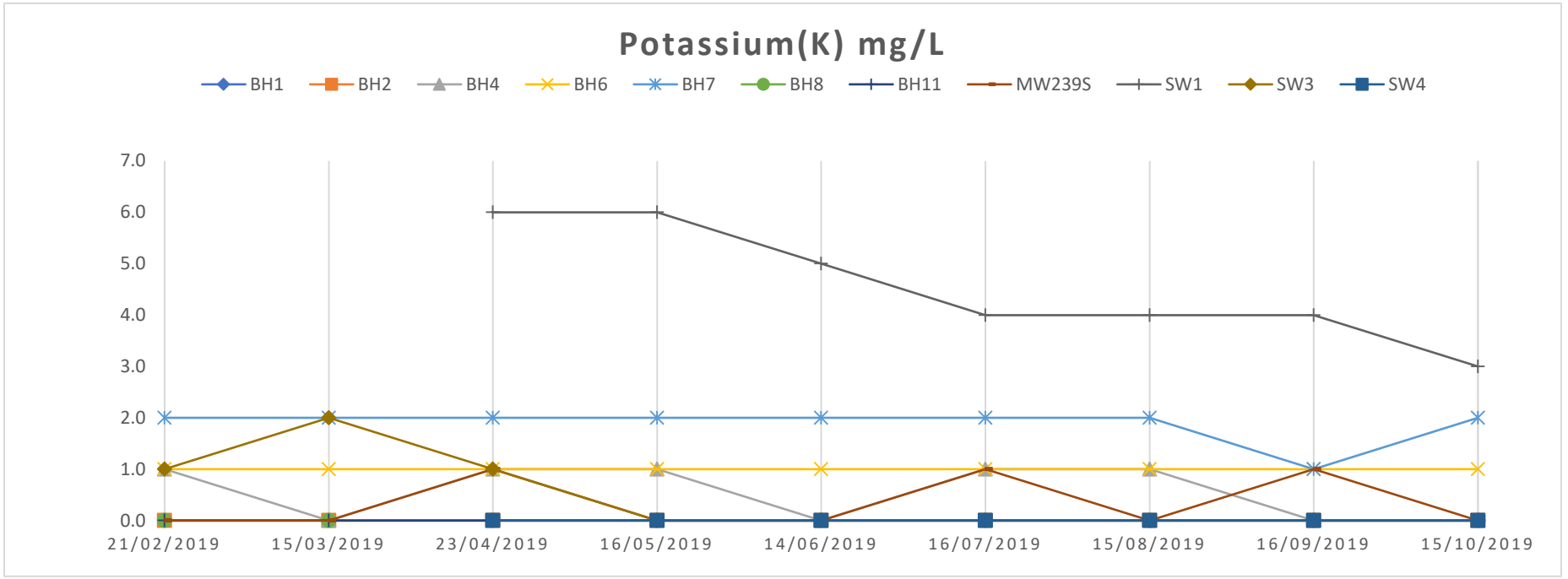

Total Phosphorus mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
2.5
2.0
1.5
1.0
0.5
0.0
1/02/2019
1/03/2019
1/04/2019
1/05/2019
1/06/2019
1/07/2019
1/08/2019
1/09/2019

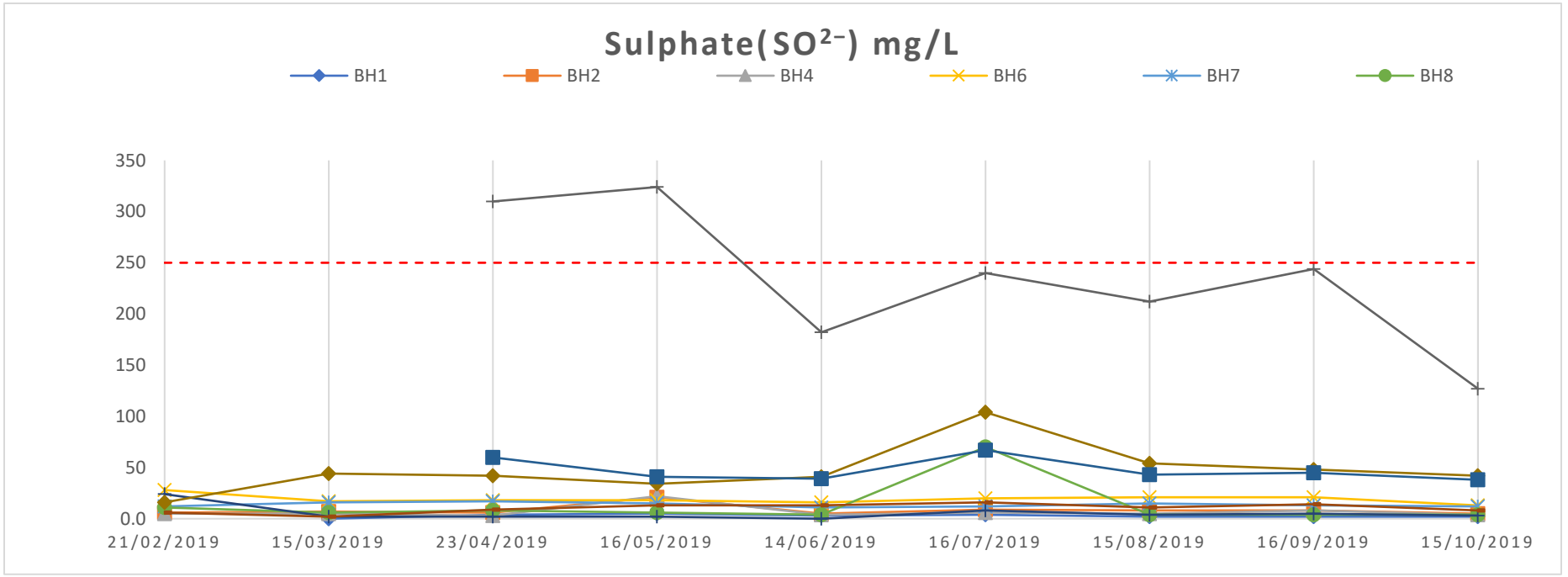

Total Dissolved Solids (TDS) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
800
700
600
500
400
300
200
100
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

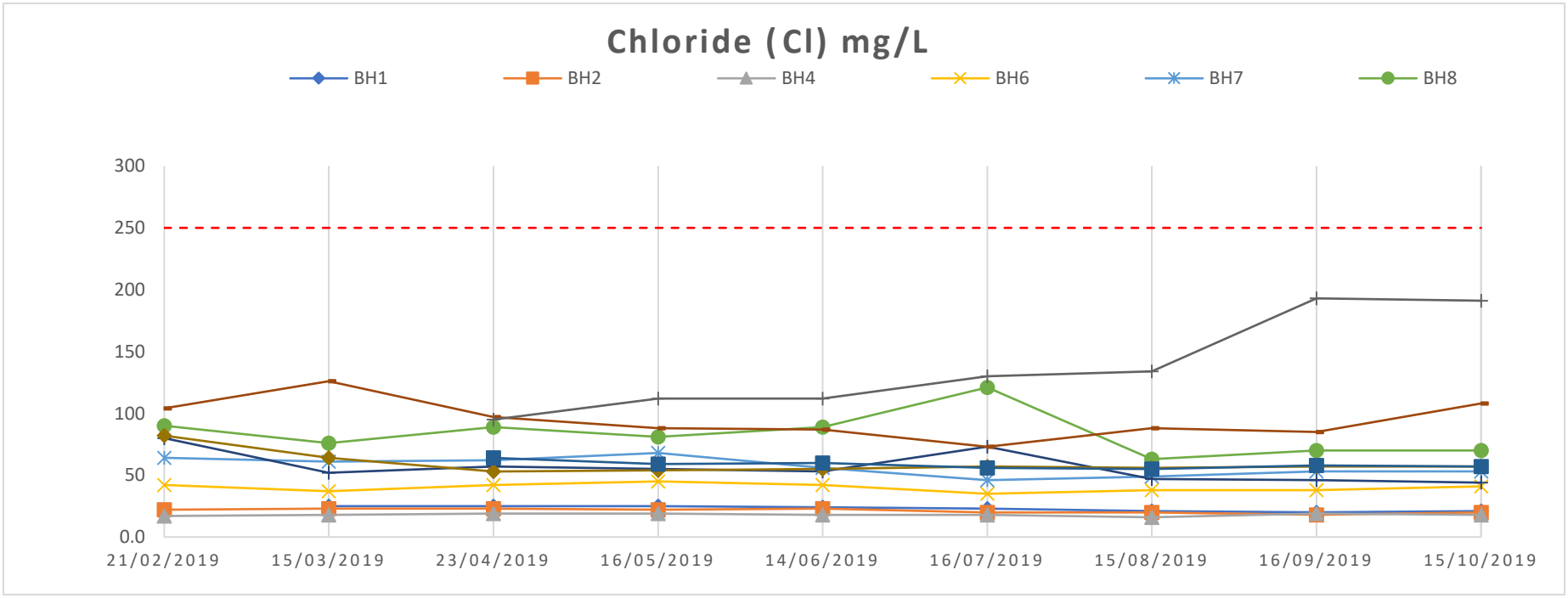

Sodium(Na) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
200
180
160
140
120
100
80
60
40
20
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

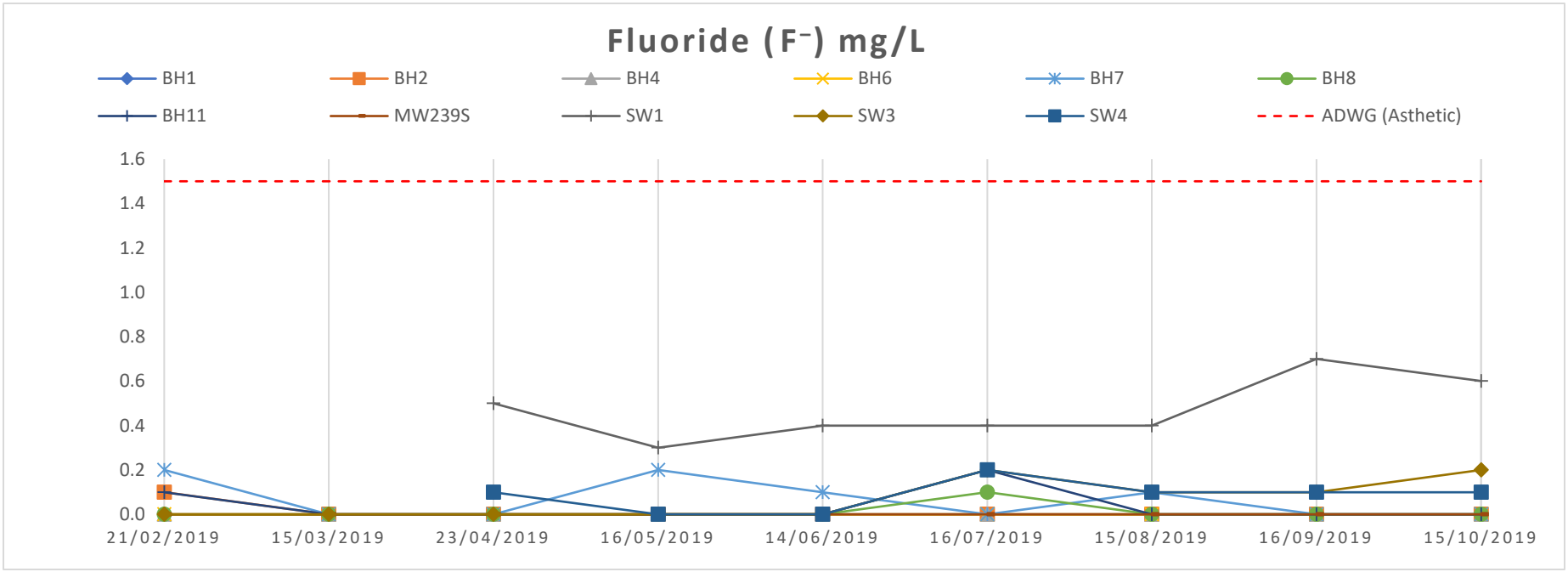

Calcium(Ca) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
40
35
30
25
20
15
10
5.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019


Magnesium(Mg) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
60
50
40
30
20
10
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019


Potassium(K) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019


Sulphate(SO²⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019


Chloride (Cl) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019


Fluoride (F⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019

APPENDIX B10: NOVEMBER 2019

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ABN: 23 146 082 500
NEWCASTLE OFFICE

26 November 2019
Document Ref: NCA19R104403

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry – November 2019 monitoring

Please find enclosed the Quarterly water quality monitoring results at Cabbage Tree Road Sand Quarry for the November 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The November monitoring round was a quarterly monitoring event and included gauging of all available monitoring wells (a total of 14 wells) and sampling from 10 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled) including additional analytical parameters and sampling at four surface water locations.

2. SITE WORK

The quarterly monitoring round was conducted on 18 November 2019. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in trends as outlined in **Appendix B**.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The November 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 has now been decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 3 locations (SW2 was dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
Extended Water Suite*	11	0	0	0	0
Hydrocarbons**	11	1	1	1	1
Metals***	11	1	1	1	1
Iron (dissolved)	11	1	1	1	1
Total Dissolved Solids (TDS)	11	0	0	0	0
Total Suspended Solids (TSS)	11	0	0	0	0
PFAS (28 analytes, standard level)	7	1	1	1	1

* Extended Water Suite B: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Hardness & TDS (Calc'), Nitrite, Nitrate, Ammonia, Reactive Phosphorus, Total Phosphorus, Total Nitrogen, TKN
** TRH (C6 – C40), BTEXN (Silica Gel)
*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn).

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.432	2.208	8.28	Cloudy brown, sulfur odour
BH2	7.79	5.721	2.069	9.03	Dark brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned
BH4	3.06	1.624	1.436	6.11	Cloudy brown, slight sulfur odour
BH5	7.36	5.792	1.568	8.8	No odour - No sample taken.

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH6	3.62	1.657	1.963	4.62	Cloudy brown, slight sulfur odour
BH7	2.98	1.588	1.392	4.61	Cloudy brown, slight sulfur odour.
BH8	3.88	2.312	1.568	6.28	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.621	3.009	5.39	Cloudy light brown, sulfur odour
BH12	8.67	6.89	1.78	8.2	No sample taken.
MW239S	3.04	1.256	1.784	4.06	Cloudy brown, sulfur odour
MW239D	3.04	1.238	1.802	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	0.02	2.52	N/A	Significant reduction in water level, tannins stained brown, sulfur odour
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	0.02	1.02	N/A	Mostly clear (red algae present), no odour
SW04*	N/A	0.15	2.15	N/A	Clear, no odour.

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1350	21.56	182	5.43	67.3
BH02	1330	21.76	133	4.61	230
BH04	1010	21.07	95	4.53	290
BH06	1230	23.12	335	4.8	6.4
BH07	1210	21.79	391	4.6	13.1
BH08	1450	22.5	545	4.51	-28.8
BH11	1400	22.65	324	4.62	34
MW239S	1300	21.18	718	4.58	-17.6
SW01	1145	23.75	1964	4.53	230
SW03	0945	19.54	470	5.04	97.7
SW04	1045	18.46	538	4.56	219

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean

rainfall totals, groundwater elevation (mAHD), field electrical conductivity (µs/cm), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness, manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium, potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	11	11	142	No	Slight increase across all sample locations
	Sulphate	1	11	<1	165	No	Similar
	Chloride	1	11	18	230	No	Slight increase across most sample locations
	Fluoride	0.1	11	<0.1	0.5	No	Similar
	Reactive [3] Phosphorous	0.01	11	<0.1	<0.1	No	Similar
	Total Phosphorous [3]	0.01	11	<0.1	2.11	7 above ANZECC 2000 Trigger range [1] (BH11, BH2, BH4, BH6, BH8, MW239S & SW3)	Significant increase for BH11. Similar results for all other sample locations.
	Nitrite [3]	0.01	11	<0.01	<0.01	No	Similar
	Nitrate [3]	0.01	11	<0.01	1.01	1 above ANZECC 2000 Trigger range [1] (BH2)	Similar
	Ammonia [3]	0.01	11	<0.01	0.23	No	Similar
	Total Nitrogen [3]	0.1	11	0.2	5.9	8 above ANZECC 2000 Trigger range [1] (BH2, BH11, BH6, BH7, BH8, MW239S, SW1 & SW3)	Significant increase for BH11. Similar results for other sample locations.
	Total Hardness	1	11	7.0	158	No	Slight decrease across all sample locations
	Total Dissolved Solids	1	11	56	708	1 above NHMRC ADWG 6 aesthetics (SW1)	Similar
	pH	0.01	11	4.48	6.29	All outside ANZECC 2000 Trigger range[1] and drinking water guidelines	pH values increased at BH1. All other sample locations similar.

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Dissolved Metals	As	0.001	11	<0.001	<0.001	No	Similar
	B	0.05	11	<0.005	0.11	No	Similar
	Ba	0.001	11	0.001	0.042	No	Similar
	Be	0.001	11	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	11	<0.0001	<0.0001	No	Similar
	Cr	0.005-0.1	11	<0.001	0.004	5 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH8, BH11 & MW239S)	Similar
	Co	0.001	11	<0.001	0.003	No	Similar
	Cu	0.001	11	<0.001	0.013	3 above ANZECC 2000 Trigger Values[2] (BH2, BH4 & BH8)	General decrease in concentrations following a spike in September 2019 with the exception of BH2 indicating an increase in concentrations.
	Fe	0.05	11	<0.05	11.3	9 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S, SW1, SW3 & SW4)	Significant increases in concentrations at BH1 and SW4.
	Mn	0.001	11	0.001	0.366	No	Similar
	Ni	0.001	11	<0.001	0.013	2 above ANZECC 2000 Trigger Values[2] (BH7 & BH8)	Similar or slight decrease in concentrations at surface water locations. General increase at groundwater locations.
	Pb	0.005-0.1	11	<0.001	<0.001	No	Similar
	Se	0.005-0.1	11	<0.01	<0.01	No	Similar
	V	0.005-0.1	11	<0.01	<0.01	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Zn	0.005-0.1	11	0.006	0.055	7 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH6, BH7, BH8, MW239S, & SW1)	Similar
	Hg	0.0001	11	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	11	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	11	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	11	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	11	<0.02	<0.02	No	Similar
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	11	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	11	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	11	<0.002	<0.002	No	Similar
	Naphthalene	0.001	11	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	PFOA	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar
	PFDS	0.00001-0.0001	7	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.

[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)

[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater

National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018

[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in October than the mean leading up to the November monitoring event. November rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for November 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	
8th	0	0	0	0	0	0	1.6	0	0	0	0	
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	
12th	3.0	0	0	0	0	0	0	0	0	23	0	
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	
14th	0	0	0	0.2	0	0	0	0	0	0	0	
15th	0	0	0	1.4	0	0	0	0	0	0	0	
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	
17th	0	0	59.4	1.4	0	0	0	0	16.8	0		
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0		
19th	0	0	2.2	0.2	0	0	0	0	7.2	0		
20th	2.4		0	2.0	0	0	0	0	0	0		
21st	1.0	1.4	0	0.2	0	0	0	0	0	0		
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0		
23rd	0	1.4	0	0	0	20	0	0		0		
24th	0	9.2	5.4	0	0	50.6	0	0	0	0		
25th	0	0	5.2	0	0	15.2	2.0	0	0	0		
26th	0	0	0	0	0	1.8	0	0	0	0		
27th	0	0	0	0	0	0.8	0	0	0	0		
28th	1.0	0	0	0	0.8	0	0	0	0	0		
29th	0		0	0	0	0	0	0	0	0		
30th	0		38.2	0	0	0	0.6	21.2	0	0		
31st	0		6.6		0		10	67.4				
Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**98.6**	**75.4**	**44.8**	**18**	
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**73.2**	**60.6**	**73.5**	**82.3**	**78.6**

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

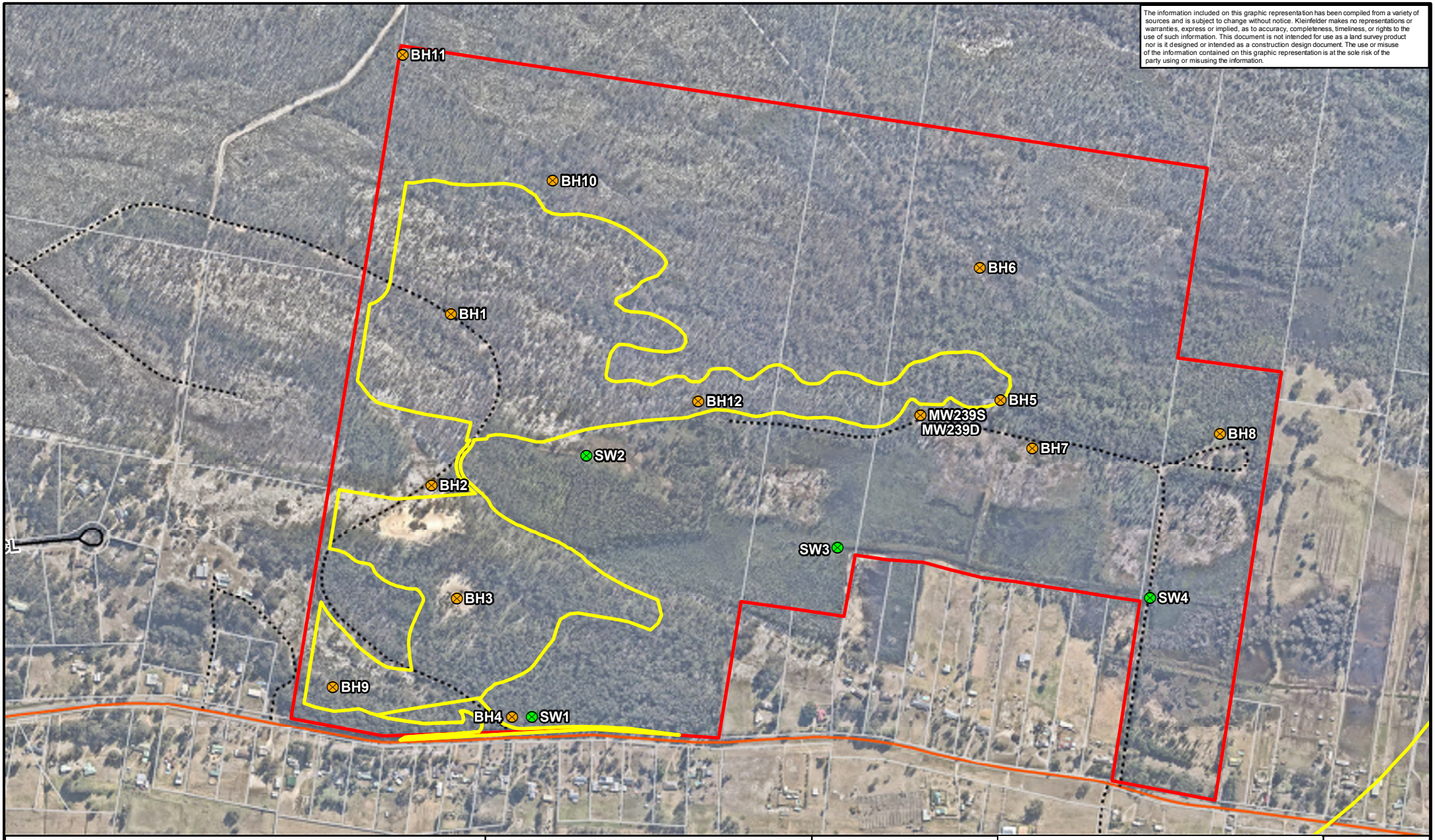
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations November 2019 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

L:\GIS FOLDER\00 CLIENT FILES\126863_TrusteeForWSS_UnitTrust\20170448_Williamtown\Mapping\20170448_WMP_Fig2_WaterMonitoringPlan.mxd

DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20	< 100	< 100	**140**	< 100	**140**
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

MW239S	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalen

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.006**	-	< 0.001	**0.007**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.037**
	18-Nov-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**11**	< 0.001	**0.008**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.012**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.004**	-	< 0.001	**0.006**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	18-Nov-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.95**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.006**	-	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	18-Nov-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.013**	**0.08**	< 0.001	**0.011**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.028**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
	15-Oct-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.011**	-	< 0.001	**0.136**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.014**
	18-Nov-19	< 0.001	**0.011**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.005**	< 0.05	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
	15-Oct-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.006**
	18-Nov-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.58**	< 0.001	**0.009**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.073**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.009**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	**0.003**	-	< 0.001	**0.018**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.016**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.1**	< 0.001	**0.015**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	**0.002**	-	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**2.49**	< 0.001	**0.01**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.003**	-	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.1**	< 0.001	**0.004**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.03**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
	15-Oct-19	< 0.001	**0.036**	< 0.001	**0.07**	< 0.0001	< 0.001	**0.005**	**0.003**	-	< 0.001	**0.383**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.055**
	18-Nov-19	< 0.001	**0.042**	< 0.001	**0.11**	< 0.0001	**0.001**	**0.003**	< 0.001	**1.14**	< 0.001	**0.366**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.026**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
	15-Oct-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.005**	**0.002**	-	< 0.001	**0.027**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.022**
	18-Nov-19	< 0.001	**0.031**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.026**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.037**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.004**	-	< 0.001	**0.031**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.018**
	18-Nov-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**6.32**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids							
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56			
HEPA NEMP 2018***						0.00023						19			
HEPA NEMP 2018[4]												5.6			
Sample Name	Sample Date														
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	**0.02**	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
MW239S	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03** *	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

			Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids			
Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
0.02	0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05

Sum of PFAS				
Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS		
0.01	0.01	0.01		
µg/L	µg/L	µg/L		
0.07				
0.7				
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	**0.02**		
< 0.01	< 0.01	**0.02**		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01		
< 0.01	< 0.01	< 0.01

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations														Alkalinity							Inorganics		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01		0.01	1	1	1	1	1	1	1	10	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
ANZECC 2000 Trigger Values									0.02*	0.025*				0.9**	0.35*											125-2200			6.5 - 8.0*
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]											200[3]		600[3]		6.5<8.5[3]
Sample Name	Sample Date																												
BH1	15-May-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-	-	9.0	< 1.0	< 1.0	9.0	9.0	104	68	129	5.67
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-	-	10	< 1.0	< 1.0	10	11	84	55	97	5.83
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-	1.7	10	< 1.0	< 1.0	10	8.0	105	68	164	5.82
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-	-	10	< 1.0	< 1.0	10	8.0	99	64	72	5.52
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-	-	11	< 1.0	< 1.0	11	8.0	102	66	84	5.62
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-	-	14	< 1.0	< 1.0	14	8.0	128	83	82	6.22
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-	1.84	8.0	< 1.0	< 1.0	8.0	8.0	102	66	88	5.44
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71	-	-	4.0	< 1.0	< 1.0	4.0	8.0	98	64	-	5.5
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19	-	2.26	24	< 1.0	< 1.0	24	8.0	126	82	-	6.29
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-	3.21	< 1.0	< 1.0	< 1.0	< 1.0	41	346	278	-	4.67
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	8.0	186	121	144	4.82
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.66	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	150	98	135	4.99
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-	3.0	< 1.0	< 1.0	< 1.0	< 1.0	16	188	122	216	4.91
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	175	114	107	4.84
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-	-	< 1.0	< 1.0	< 1.0	< 1.0	33	318	207	192	4.68
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	197	128	135	4.88
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-	3.18	< 1.0	< 1.0	< 1.0	< 1.0	12	195	127	140	4.66
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	194	126	-	4.92
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5	-	3.3	< 1.0	< 1.0	< 1.0	< 1.0	12	193	125	-	5.12
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	91	128	-	4.87
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	101	66	90	4.71
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	70	46	84	4.82
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-	1.44	< 1.0	< 1.0	< 1.0	< 1.0	13	94	61	144	4.85
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	91	59	51	4.76
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	90	58	63	4.84
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-	-	< 1.0	< 1.0	< 1.0	< 1.0	11	110	72	61	5.2
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	96	62	60	4.72
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	102	66	-	5.06
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68	-	2.02	< 1.0	< 1.0	< 1.0	< 1.0	9.0	102	66	-	5.47
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-	0.46	9.0	< 1.0	< 1.0	< 1.0	9.0	14	60	438	-	5.55
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-	1.15	6.0	< 1.0	< 1.0	6.0	9.0	73	96	-	5.4
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-	-	< 1.0	< 1.0	< 1.0	< 1.0	5.0	77	50	70	5.12
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	54	35	61	5.05
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-	1.3	< 1.0	< 1.0	< 1.0	< 1.0	9.0	73	47	100	4.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	1.19	0.99	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	69	45	36	4.84
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-	-	< 1.0	< 1.0	< 1.0	< 1.0	13	75	49	42	4.96
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	9.0	85	55	49	5.01
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-	1.32	< 1.0	< 1.0	< 1.0	< 1.0	13	95	62	58	4.83
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	7.0	85	55	-	4.93
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63	-	1.86	< 1.0	< 1.0	< 1.0	< 1.0	7.0	86	56	-	5.34
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-	3.59	< 1.0	< 1.0	< 1.0	< 1.0	25	260	211	-	4.87
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-	2.49	< 1.0	< 1.0	< 1.0	< 1.0	24	177	144	-	4.37
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-	-	2.0	< 1.0	< 1.0	2.0	21	179	116	146	4.95
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-	-	< 1.0	< 1.0	< 1.0	< 1.0	24	136	88	115	4.64
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-	2.04	< 1.0	< 1.0	< 1.0	< 1.0	24	175	114	214	4.88
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	174	113	90	4.82
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	161	105	82	4.73
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-	-	< 1.0	< 1.0	< 1.0	< 1.0	17	201	131	104	4.87
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-	2.44	2.0	< 1.0	< 1.0	2.0	20	197	128	124	4.68
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43	-	-	< 1.0	< 1.0	< 1.0	< 1.0	21	202	117	-	5.17
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64	-	2.64	< 1.0	< 1.0	< 1.0	< 1.0	20	204	133	-	5.32
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-	3.16	< 1.0	< 1.0	< 1.0	< 1.0	20	213	196	-	4.76
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	25	271	176	212	4.73
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	205	133	185	4.54
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-	3.26	< 1.0	< 1.0	< 1.0	< 1.0	20	235	153	310	4.87
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	213	138	145	4.91
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	202	131	164	5.0
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-	-	8.0	< 1.0	< 1.0	8.0	16	232	151	168	5.53
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-	2.79	5.0	< 1.0	< 1.0	5.0	16	222	144	181	5.07
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	252	164	-	4.95
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89	-	2.89	< 1.0	< 1.0	< 1.0	< 1.0	20	239	155	-	4.97
BH8	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	352	258	-	4.46
	14-Mar-19	45	< 1.0	6.0	< 1.0	6.0	76	< 0.1	-	-	-	-	-	-	-	-	2.45	2.27	-	-	< 1.0	< 1.0	< 1.0	< 1.0	25	319	207	253	4.77
	23-Apr-19	53	< 1.0	7.0	< 1.0	8.0	89	< 0.1	-	-	-	-	-	-	-	-	2.88	2.68	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	264	172	223	4.76
	16-May-19	47	< 1.0	6.0	< 1.0	6.0	81	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	2.37	2.43	-	4.86	1.0	< 1.0	< 1.0	1.0	16	302	196	354	4.9
	14-Jun-19	47	< 1.0	5.0	< 1.0	4.0	89	< 0.1	-	-	-	-	-	-	-	-	2.46	2.59	-	-	< 1.0	< 1.0	< 1.0	< 1.0	20	315	205	194	4.82
	16-Jul-19	57	< 1.0	5.0	< 1.0	70	121	0.1	-	-	-	-	-	-	-	-	2.89	4.87	26	-	< 1.0	< 1.0	< 1.0	< 1.0	20	353	229	226	4.78
	15-Aug-19	42	< 1.0	3.0	< 1.0	4.0	63	< 0.1	-	-	-	-	-	-	-	-	2.07	1.86	-	-	< 1.0	< 1.0	< 1.0	< 1.0	12	260	169	140	5.0
	16-Sep-19	46	< 1.0	3.0	< 1.0	4.0	70	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.13	1.1	1.1	2.25	2.06	-	5.43	< 1.0	< 1.0	< 1.0	< 1.0	12	293	190	206	4.85
	15-Oct-19	45	< 1.0	4.0	< 1.0	4.0	70	< 0.1	-	-	-	-	-	-	-	-	2.29	2.06	-	-	< 1.0	< 1.0	< 1.0	< 1.0	16	303	197	-	5.02
	18-Nov-19	49	< 1.0	4.0	< 1.0	8.0	80	0.1	< 0.01	0.58	< 0.01	0.01	0.01	0.17	1.3	1.3	2.46	2.42	-	5.06	< 1.0	< 1.0	< 1.0	< 1.0	16	316	206	-	5.12
MW239S	22-Feb-19	61	< 1.0	6.0	< 1.0	6.0	104	< 0.1	< 0.01	0.56	< 0.01	< 0.01	< 0.01	0.18	3.9	3.9	3.15	3.06	1.43	5.21	< 1.0	< 1.0	< 1.0	< 1.0	25	329	234	-	4.89
	14-Mar-19	64	< 1.0	6.0	< 1.0	2.0	126	< 0.1	-	-	-	-	-	-	-	-	3.28	3.64	5.18	-	2.0	< 1.0	< 1.0	2.0	25	410	266	232	5.02
	23-Apr-19	64	< 1.0	7.0	1.0	9.0	97	< 0.1	-	-	-	-	-	-	-	-	3.38	2.92	7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	29	294	191	208	4.92
	16-May-19	52	< 1.0	6.0	< 1.0	13	88	< 0.1	< 0.01	0.43	< 0.01	< 0.01	< 0.01	0.09	1.7	1.7	2.76	2.75	-	4.44	< 1.0	< 1.0	< 1.0	< 1.0	25	327	212	320	4.87
	14-Jun-19	50	< 1.0	6.0	< 1.0	13	87	< 0.1	-	-	-	-	-	-	-	-	2.67	2.86	-	-	7.0	< 1.0	< 1.0	7.0	25	334	217	220	5.39
	16-Jul-19	52	< 1.0	7.0	1.0	16	73	< 0.1	-	-	-	-	-	-	-	-	2.86	2.39	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	353	229	188	4.85
	15-Aug-19	54	< 1.0	7.0	< 1.0	11	88	< 0.1	-	-	-	-	-	-	-	-	2.92	2.71	-	-	< 1.0	< 1.0	< 1.0	< 1.0	29	359	233	195	4.83
	16-Sep-19	55	< 1.0	6.0	1.0	14	85	< 0.1	< 0.01	0.32	< 0.01	< 0.01	< 0.01	0.1	1.4	1.4	2.91	2.69	-	4.7	< 1.0	< 1.0	< 1.0	< 1.0	25	373	242	224	4.66
	15-Oct-19	58	< 1.0	6.0	1.0	8.0	108	< 0.1	-	-	-	-	-	-	-	-	3.02	3.21	3.15	-	< 1.0	< 1.0	< 1.0	< 1.0	25	404	263	-	4.86
	18-Nov-19	63	< 1.0	6.0	1.0	8.0	118	< 0.1	< 0.01	0.23	< 0.01	< 0.01	< 0.01	0.17	1.2	1.2	3.26	3.5	3.48	5.38	< 1.0	< 1.0	< 1.0	< 1.0	25	419	272	-	4.76
SW1	23-Apr-19	94	34	52	6.0	310	95	0.5	-	-	-	-	-	-	-	-	10	9.13	5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	299	893	580	707	4.01
	16-May-19	86	24	42	6.0	324	112	0.3	< 0.01	0.13	< 0.01	< 0.01	< 0.01	< 0.01	1.8	1.8	8.94	9.9	5.13	2.45	< 1.0	< 1.0	< 1.0	< 1.0	233	947	616	715	4.6
	14-Jun-19	77	20	34	5.0	182	112	0.4	-	-	-	-	-	-	-	-	7.27	6.95	2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	190	847	550	512	4.5
	16-Jul-19	90	20	35	4.0	240	130	0.4	-	-	-	-	-	-	-	-	7.9	8.66	4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	194	876	569	568	4.42
	15-Aug-19	97	18	32	4.0	212	134	0.4	-	-	-	-	-	-	-	-	7.85	8.19	2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	177	813	528	548	4.53
	16-Sep-19	117	21	39	4.0	244	193	0.7	< 0.01	0.05	< 0.01	0.02	0.02	< 0.01	1.2	1.2	9.45	11	5.38	3.49	< 1.0	< 1.0	< 1.0	< 1.0	213	1,080	702	689	4.32
	15-Oct-19	124	16	31	3.0	127	191	0.6	-	-	-	-	-	-	-	-	8.82	8.03	4.68	-	< 1.0	< 1.0	< 1.0	< 1.0	168	1,050	682	-	5.32
	18-Nov-19	142	14	30	4.0	165	234	0.5	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.03	1.1	1.1	9.45	10	3.03	4.91	< 1.0	< 1.0	< 1.0	< 1.0	158	1,090	708	-	5.06
SW3	22-Feb-19	40	4.0	4.0	1.0	16	82	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.16	1.0	1.0	2.55	2.87	-	3.38	11	< 1.0	< 1.0	11	26	262	228	-	6.21
	14-Mar-19	45	6.0	6.0	2.0	44	64	< 0.1	-	-	-	-	-	-	-	-	2.8	2.8	-	-	4.0	< 1.0	< 1.0	4.0	40	344	224	279	5.42
	23-Apr-19	37	8.0	6.0	1.0	42	53	< 0.1	-	-	-	-	-	-	-	-	2.53	2.37	-	-	< 1.0	< 1.0	< 1.0	< 1.0	45	220	143	190	5.2
	16-May-19	35	7.0	5.0	< 1.0	34	54	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.1	2.28	2.25	-	2.47	1.0	< 1.0	< 1.0	1.0	38	271	176	300	5.24
	14-Jun-19	32	7.0	6.0	< 1.0	41	55	< 0.1	-	-	-	-	-	-	-	-	2.24	2.4	-	-	< 1.0	< 1.0	< 1.0	< 1.0	42	300	195	170	4.58
	16-Jul-19	46	8.0	12	< 1.0	104	57	0.2	-	-	-	-	-	-	-	-	3.39	3.77	5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	69	451	293	246	4.47
	15-Aug-19	38	6.0	7.0	< 1.0	54	56	0.1	-	-	-	-	-	-	-	-	2.53	2.7	-	-	< 1.0	< 1.0	< 1.0	< 1.0	44	338	220	192	4.47
	16-Sep-19	42	7.0	8.0	< 1.0	48	57	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.1	0.1	2.83	2.61	-	2.57	< 1.0	< 1.0	< 1.0	< 1.0	50	374	243	201	4.3
	15-Oct-19	40	5.0	7.0	< 1.0	42	57	0.2	-	-	-	-	-	-	-	-	2.56	2.48	-	-	< 1.0	< 1.0	< 1.0	< 1.0	41	383	249	-	4.75
	18-Nov-19	36	5.0	5.0	< 1.0	29	56	< 0.1	< 0.01	0.04	< 0.01	0.01	0.01	0.03	0.6	0.6	2.23	2.18	-	2.72	< 1.0	< 1.0	< 1.0	< 1.0	33	278	181	-	5.39
SW4	23-Apr-19	39	5.0	5.0	< 1.0	60	64	0.1	-	-	-	-	-	-	-	-	2.36	3.05	13	-	< 1.0	< 1.0	< 1.0	< 1.0	33	293	190	198	4.0
	16-May-19	41	5.0	5.0	< 1.0	41	59	< 0.1	0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	0.2	0.2	2.44

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons			
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons -		
C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	< 20	< 20					-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC					NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 50	-	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
800	< 50	< 100	< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Silcia Clean up	
>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
µg/L	µg/L
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
-	-
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
-	-
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09_181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09_181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09_18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	NC	**181%**	NC	NC	9%	NC	**111%**	NC	NC	**172%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids							
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type								
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC
TRIP BLANK 09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Perfluoroalkyl Carboxylic Acids										
Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Perfluoroalkyl Sulfonamides					(n:2) Fluorotelomer Sulfonic Acids				
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	0%
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	0.03
NC	NC	NC	NC	NC	NC	NC	NC	NC	**100%**
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Sum of PFAS	
Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
0.01	0.01
0.01	0.01
0%	0%
0.01	0.01
< 0.05	< 0.1
86%	**133%**
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1938033**	Page	: 1 of 22
Amendment	: **3**		
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 18-Nov-2019 16:05
Order number	: 20193820	Date Analysis Commenced	: 19-Nov-2019
C-O-C number	: 5958	Issue Date	: 27-Nov-2019 17:55
Sampler	: DANIEL KOUSBROEK		
Site	: Williamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 14		
No. of samples analysed	: 14		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EN055: Ionic Balance out of acceptable limits for sample ES1938033-#001 due to analytes not quantified in this report.
- Amendment (26/11/2019): This report has been amended and re-released to allow the reporting of additional analytical data.
- Amendment (27/11/2019): This report has been amended as a result of changes to the contacts for the distribution of the report. All analysis results are as per the previous report.
- Amendment (27/11/2019): This report has been amended to allow the distribution of an Electronic Data Deliverable (EDD) not previously provided. All analysis results are as per the previous report.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit		ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.29	5.47	5.34	5.32	4.97
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		2.26	2.02	1.86	2.64	2.89
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		126	102	86	204	239
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		82	66	56	133	155
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	9	7	20	20
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		24	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		24	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3	7	6	18	15
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		23	19	18	45	56
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	1	3	<1
Magnesium	7439-95-4	1	mg/L		2	1	1	3	5
Sodium	7440-23-5	1	mg/L		16	14	11	27	31
Potassium	7440-09-7	1	mg/L		<1	<1	<1	1	1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.001	0.007	0.011	0.030	0.016
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.002
Chromium	7440-47-3	0.001	mg/L		0.004	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		<0.001	0.013	0.005	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.008	0.011	0.013	0.009	0.015
Nickel	7440-02-0	0.001	mg/L		0.001	0.007	0.001	0.008	0.013

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit		ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.012**	**0.028**	<0.005	**0.073**	**0.053**
Iron	7439-89-6	0.05	mg/L		**11.3**	**0.08**	<0.05	**1.58**	**1.10**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.1**	<0.1	<0.1	<0.1	**0.1**
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.13**	**0.05**	<0.01	**0.23**	**0.17**
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	**1.01**	**0.29**	<0.01	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**1.01**	**0.29**	<0.01	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.3**	**1.1**	<0.1	**0.4**	**0.5**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	**2.1**	**0.3**	**0.4**	**0.5**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.21**	**0.08**	**0.06**	**0.02**
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.19**	**0.68**	**0.63**	**1.64**	**1.89**
ø Total Cations	----	0.01	meq/L		**0.86**	**0.79**	**0.61**	**1.60**	**1.78**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit		ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
					Result	Result	Result	Result	Result
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit		ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	18-Nov-2019 13:35	18-Nov-2019 13:15	18-Nov-2019 11:28	18-Nov-2019 12:29	18-Nov-2019 12:09
Compound	CAS Number	LOR	Unit		ES1938033-001	ES1938033-002	ES1938033-004	ES1938033-006	ES1938033-007
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**120**	**115**	**123**	**118**	**118**
Toluene-D8	2037-26-5	2	%		**120**	**115**	**124**	**121**	**121**
4-Bromofluorobenzene	460-00-4	2	%		**111**	**111**	**115**	**115**	**113**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		----	----	**99.4**	**96.5**	**101**
13C8-PFOA	----	0.02	%		----	----	**106**	**107**	**108**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	----	----
				Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	----	----
Compound	CAS Number	LOR	Unit		ES1938033-008	ES1938033-011	ES1938033-014	--------	--------
					Result	Result	Result	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**5.12**	**5.12**	**4.76**	----	----
EA006: Sodium Adsorption Ratio (SAR)									
^ Sodium Adsorption Ratio	----	0.01	-		**5.06**	**3.30**	**5.38**	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**316**	**193**	**419**	----	----
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		**205**	**125**	**272**	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		**16**	**12**	**25**	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**8**	<1	**8**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**80**	**53**	**118**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L		**4**	**3**	**6**	----	----
Sodium	7440-23-5	1	mg/L		**49**	**28**	**63**	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	**1**	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		**0.012**	**0.004**	**0.010**	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.002**	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.010**	**0.008**	**0.004**	----	----
Nickel	7440-02-0	0.001	mg/L		**0.013**	**0.002**	**0.008**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	----	----
				Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	----	----
Compound	CAS Number	LOR	Unit		ES1938033-008	ES1938033-011	ES1938033-014	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.053**	<0.005	**0.030**	----	----
Iron	7439-89-6	0.05	mg/L		**2.49**	**0.95**	**1.10**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.17**	**0.18**	**0.17**	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	**0.06**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.01**	**0.06**	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.3**	**5.8**	**1.2**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.3**	**5.9**	**1.2**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.58**	**2.11**	**0.23**	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.42**	**1.50**	**3.50**	----	----
ø Total Cations	----	0.01	meq/L		**2.46**	**1.46**	**3.26**	----	----
ø Ionic Balance	----	0.01	%		**----**	**----**	**3.48**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	----	----
				Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	----	----
Compound	CAS Number	LOR	Unit		ES1938033-008	ES1938033-011	ES1938033-014	--------	--------
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	----	----
				Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	----	----
Compound	CAS Number	LOR	Unit		ES1938033-008	ES1938033-011	ES1938033-014	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	----	----
				Client sampling date / time	18-Nov-2019 14:45	18-Nov-2019 14:00	18-Nov-2019 12:47	----	----
Compound	CAS Number	LOR	Unit		ES1938033-008	ES1938033-011	ES1938033-014	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**127**	**115**	**122**	----	----
Toluene-D8	2037-26-5	2	%		**131**	**114**	**125**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**122**	**106**	**121**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.3**	----	----	----	----
13C8-PFOA	----	0.02	%		**101**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Client sample ID	SW-1	SW-3	SW-4	----	----
			Client sampling date / time	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	----	----
Compound	CAS Number	LOR	Unit	ES1938033-003	ES1938033-012	ES1938033-013	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.06**	**5.39**	**4.48**	----	----
EA006: Sodium Adsorption Ratio (SAR)								
^ Sodium Adsorption Ratio	----	0.01	-	**4.91**	**2.72**	**3.22**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**1090**	**278**	**348**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**708**	**181**	**226**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**158**	**33**	**30**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	<1	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**165**	**29**	**41**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**234**	**56**	**64**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**14**	**5**	**4**	----	----
Magnesium	7439-95-4	1	mg/L	**30**	**5**	**5**	----	----
Sodium	7440-23-5	1	mg/L	**142**	**36**	**41**	----	----
Potassium	7440-09-7	1	mg/L	**4**	<1	<1	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	**0.11**	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L	**0.042**	**0.031**	**0.035**	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	**0.003**	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.001**	**0.001**	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L	**0.366**	**0.026**	**0.032**	----	----
Nickel	7440-02-0	0.001	mg/L	**0.003**	<0.001	**0.002**	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW-1	SW-3	SW-4	----	----
				Client sampling date / time	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	----	----
Compound	CAS Number	LOR	Unit		ES1938033-003	ES1938033-012	ES1938033-013	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.026**	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**1.14**	**2.60**	**6.32**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.5**	<0.1	**0.2**	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.03**	**0.03**	<0.01	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		<0.01	**0.01**	**0.02**	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	**0.01**	**0.02**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.1**	**0.6**	**0.2**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**1.1**	**0.6**	**0.2**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.02**	**0.04**	<0.01	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**10.0**	**2.18**	**2.66**	----	----
ø Total Cations	----	0.01	meq/L		**----**	**----**	**2.76**	----	----
ø Total Cations	----	0.01	meq/L		**9.45**	**2.23**	**----**	----	----
ø Ionic Balance	----	0.01	%		**3.03**	**----**	**----**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW-1	SW-3	SW-4	----	----
				Client sampling date / time	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	----	----
Compound	CAS Number	LOR	Unit		ES1938033-003	ES1938033-012	ES1938033-013	--------	--------
					Result	Result	Result	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup - Continued									
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW-1	SW-3	SW-4	----	----
				Client sampling date / time	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	----	----
Compound	CAS Number	LOR	Unit		ES1938033-003	ES1938033-012	ES1938033-013	--------	--------
					Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW-1	SW-3	SW-4	----	----
				Client sampling date / time	18-Nov-2019 11:45	18-Nov-2019 10:27	18-Nov-2019 10:46	----	----
Compound	CAS Number	LOR	Unit		ES1938033-003	ES1938033-012	ES1938033-013	--------	--------
					Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**121**	**120**	**115**	----	----
Toluene-D8	2037-26-5	2	%		**118**	**108**	**111**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**114**	**110**	**108**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.6**	**98.8**	**97.4**	----	----
13C8-PFOA	----	0.02	%		**103**	**99.9**	**101**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Dup09	Rinsate09	Tripblank09	----	----
				Client sampling date / time	18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1938033-016	ES1938033-017	ES1938033-018	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		**0.034**	<0.001	<0.001	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Manganese	7439-96-5	0.001	mg/L		**0.036**	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	<0.005	----	----
Iron	7439-89-6	0.05	mg/L		**5.90**	<0.05	<0.05	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Dup09	Rinsate09	Tripblank09	----	----
				Client sampling date / time	18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1938033-016	ES1938033-017	ES1938033-018	--------	--------
					Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Dup09	Rinsate09	Tripblank09	----	----
				Client sampling date / time	18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1938033-016	ES1938033-017	ES1938033-018	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Dup09	Rinsate09	Tripblank09	----	----
				Client sampling date / time	18-Nov-2019 11:03	18-Nov-2019 14:58	18-Nov-2019 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1938033-016	ES1938033-017	ES1938033-018	--------	--------
					Result	Result	Result	----	----
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**110**	**113**	**112**	----	----
Toluene-D8	2037-26-5	2	%		**111**	**107**	**114**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**103**	**105**	**108**	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**95.5**	**93.2**	**101**	----	----
13C8-PFOA	----	0.02	%		**101**	**97.4**	**97.5**	----	----

Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Dan Kousbroek**

Report **688778-W-V2**
Project name WILLIAMTOWN SS
Project ID 20193820
Received Date Nov 19, 2019

Client Sample ID			**TRIP09**
Sample Matrix			**Water**
Eurofins Sample No.			**S19-No25594**
Date Sampled			**Nov 18, 2019**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	107
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005

Client Sample ID			TRIP09
Sample Matrix			Water
Eurofins Sample No.			S19-No25594
Date Sampled			Nov 18, 2019
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.04
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.010
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.035
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	0.007
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.033
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	81
13C5-PFPeA (surr.)	1	%	77
13C5-PFHxA (surr.)	1	%	92
13C4-PFHpA (surr.)	1	%	126
13C8-PFOA (surr.)	1	%	128
13C5-PFNA (surr.)	1	%	149
13C6-PFDA (surr.)	1	%	138
13C2-PFUnDA (surr.)	1	%	127
13C2-PFDoDA (surr.)	1	%	100
13C2-PFTeDA (surr.)	1	%	42
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	97
D3-N-MeFOSA (surr.)	1	%	54

Client Sample ID			TRIP09
Sample Matrix			Water
Eurofins Sample No.			S19-No25594
Date Sampled			Nov 18, 2019
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D5-N-EtFOSA (surr.)	1	%	72
D7-N-MeFOSE (surr.)	1	%	83
D9-N-EtFOSE (surr.)	1	%	66
D5-N-EtFOSAA (surr.)	1	%	50
D3-N-MeFOSAA (surr.)	1	%	43
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	103
18O2-PFHxS (surr.)	1	%	149
13C8-PFOS (surr.)	1	%	138
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	62
13C2-6:2 FTSA (surr.)	1	%	95
13C2-8:2 FTSA (surr.)	1	%	82
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 20, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 20, 2019	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 20, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 20, 2019	
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Melbourne	Nov 20, 2019	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Melbourne	Nov 20, 2019	7 Days
- Method: TRH C6-C36 (Silica Gel Cleanup) - MGT 100A			
Chromium (hexavalent)	Melbourne	Nov 20, 2019	28 Days
- Method: Cr (VI) by MGT 1170A			
Metals M8 filtered	Melbourne	Nov 20, 2019	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Melbourne	Nov 20, 2019	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Nov 20, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Nov 20, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Nov 20, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Nov 20, 2019	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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NATA # 1261
Site # 23736

Company Name:	Kleinfelder Aust Pty Ltd (NEWCASTLE)	**Order No.:**		**Received:**	Nov 19, 2019 1:47 PM
Address:	95 Mitchell Rd Cardiff NSW 2285	**Report #:**	688778	**Due:**	Nov 26, 2019
		Phone:	02 4949 5200	**Priority:**	5 Day
		Fax:		**Contact Name:**	Dan Kousbroek
Project Name:	WILLIAMTOWN SS				
Project ID:	20193820				

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Metals M8 filtered	TRH (after Silica Gel cleanup)	Eurofins | mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	TRIP09	Nov 18, 2019		Water	S19-No25594	X	X	X	X	X
Test Counts						1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
Chromium (hexavalent)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	117			70-130	Pass	
TRH C10-C14	%	116			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	105			70-130	Pass	
Toluene	%	110			70-130	Pass	
Ethylbenzene	%	113			70-130	Pass	
m&p-Xylenes	%	111			70-130	Pass	
Xylenes - Total	%	112			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	87			70-130	Pass	
TRH C6-C10	%	121			70-130	Pass	
TRH >C10-C16	%	109			70-130	Pass	
LCS - % Recovery							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	121			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	129			70-130	Pass	
LCS - % Recovery							
Chromium (hexavalent)	%	94			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	106			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	117			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	136			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	92			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	91			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	104			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	99			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	100			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	76			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	111			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	85			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	81			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	81			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	85			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	100			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	77			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	106			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	87			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	87			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	93			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	106			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	87			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	70			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	91			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	78			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	144			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	78			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M19-No30667	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M19-No30667	NCP	%	92			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chromium (hexavalent)	S19-No25594	CP	%	77			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S19-No25942	NCP	%	88			70-130	Pass	
Barium (filtered)	S19-No25942	NCP	%	75			75-125	Pass	
Beryllium (filtered)	S19-No25942	NCP	%	86			75-125	Pass	
Boron (filtered)	S19-No25942	NCP	%	83			75-125	Pass	
Cadmium (filtered)	S19-No25942	NCP	%	96			70-130	Pass	
Chromium (filtered)	S19-No25942	NCP	%	91			70-130	Pass	
Cobalt (filtered)	S19-No25942	NCP	%	93			75-125	Pass	
Copper (filtered)	S19-No25942	NCP	%	94			70-130	Pass	
Lead (filtered)	S19-No25942	NCP	%	93			70-130	Pass	
Manganese (filtered)	S19-No25942	NCP	%	92			70-130	Pass	
Mercury (filtered)	S19-No25942	NCP	%	83			70-130	Pass	
Nickel (filtered)	S19-No25942	NCP	%	92			70-130	Pass	
Vanadium (filtered)	S19-No25942	NCP	%	93			75-125	Pass	
Zinc (filtered)	S19-No25942	NCP	%	87			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M19-No22937	NCP	%	122			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M19-No22937	NCP	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M19-No22937	NCP	%	132			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M19-No22937	NCP	%	91			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M19-No22937	NCP	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	M19-No22937	NCP	%	106			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M19-No22937	NCP	%	102			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M19-No22937	NCP	%	95			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M19-No22937	NCP	%	92			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M19-No22937	NCP	%	53			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-No22937	NCP	%	108			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M19-No22937	NCP	%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-No22937	NCP	%	79			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-No22937	NCP	%	64			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-No22937	NCP	%	83			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-No22937	NCP	%	92			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-No22937	NCP	%	82			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-No22937	NCP	%	98			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M19-No22937	NCP	%	100			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M19-No22937	NCP	%	83			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M19-No22937	NCP	%	93			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropentanesulfonic acid (PFPeS)	M19-No22937	NCP	%	108			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M19-No22937	NCP	%	94			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M19-No22937	NCP	%	73			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M19-No22937	NCP	%	77			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-No22937	NCP	%	60			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-No22937	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M19-No22937	NCP	%	101			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-No22937	NCP	%	141			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-No22937	NCP	%	55			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S19-No27160	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	B19-No30370	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S19-No27160	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S19-No27160	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S19-No27160	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S19-No27160	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S19-No27160	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	B19-No30370	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	B19-No30370	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M19-No28046	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S19-No25942	NCP	mg/L	0.003	0.003	1.0	30%	Pass	
Barium (filtered)	S19-No25942	NCP	mg/L	0.10	0.12	10	30%	Pass	
Beryllium (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	S19-No25942	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	S19-No25942	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S19-No25942	NCP	mg/L	0.004	0.004	11	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Copper (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	S19-No25942	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S19-No25942	NCP	mg/L	0.012	0.013	10	30%	Pass	
Mercury (filtered)	S19-No25942	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S19-No25942	NCP	mg/L	0.005	0.005	12	30%	Pass	
Vanadium (filtered)	S19-No25942	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S19-No25942	NCP	mg/L	0.029	0.031	7.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M19-No22673	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-No22673	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

New version with amendments to fix the matrix type.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

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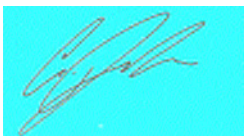
Joseph Edouard	Senior Analyst-Organic (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)



Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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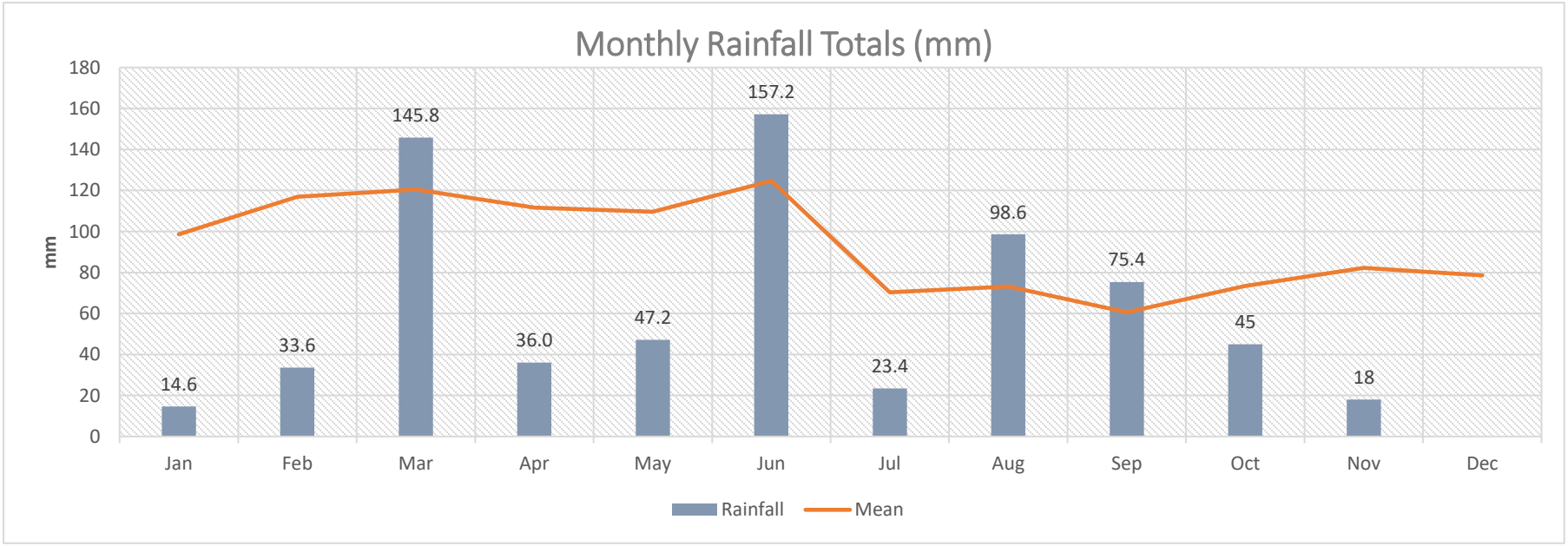
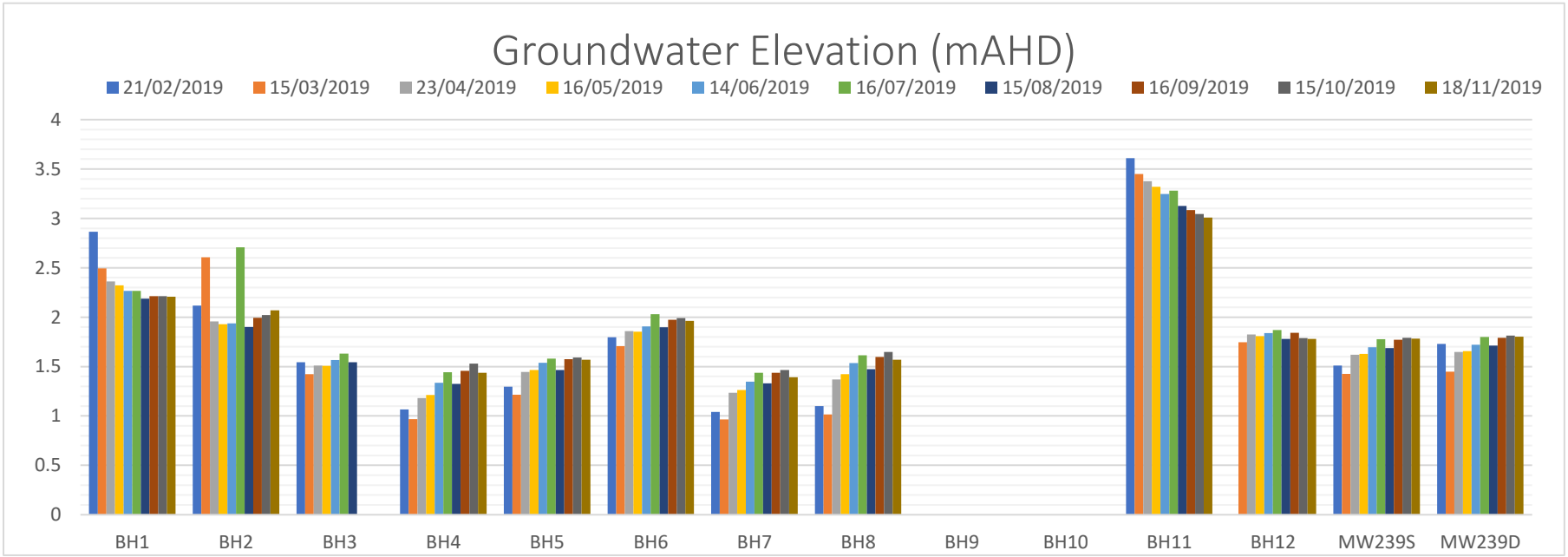
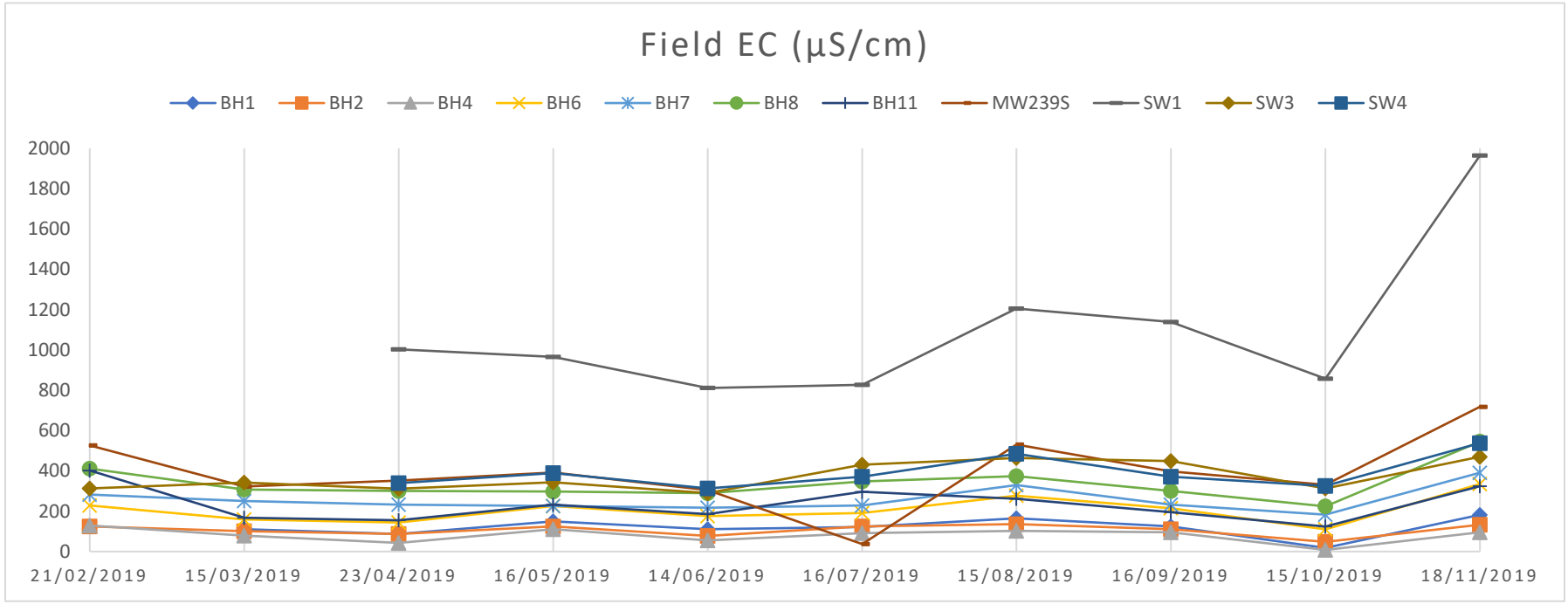
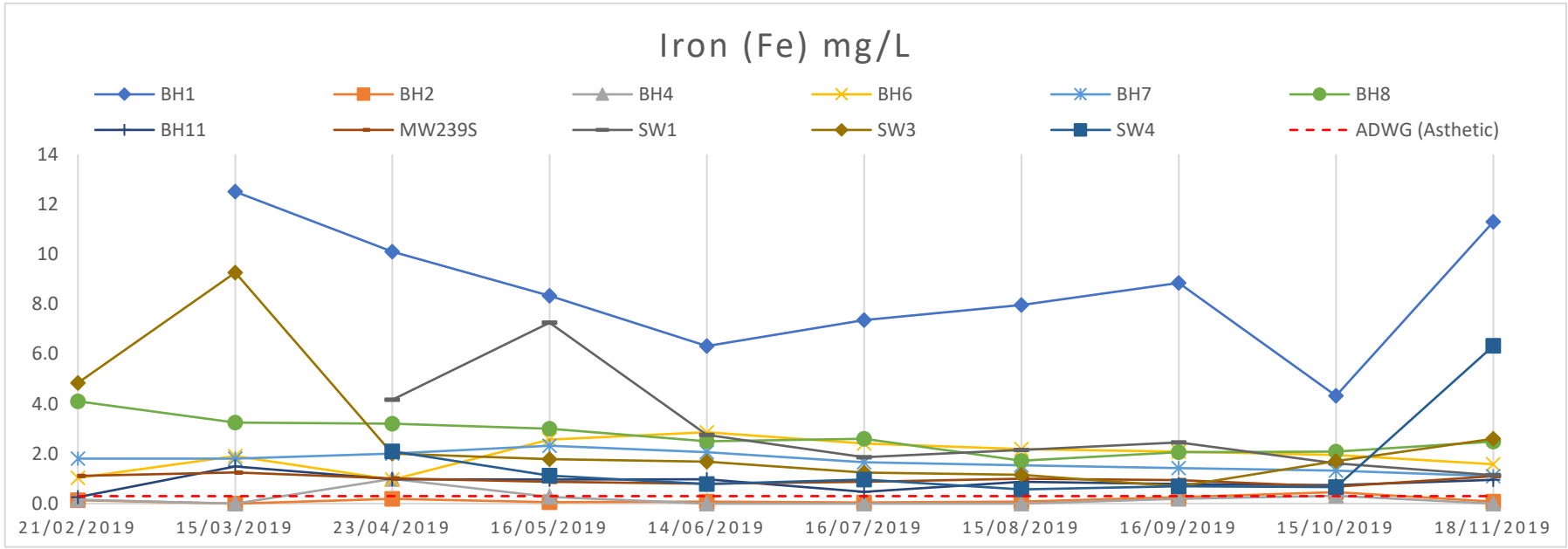
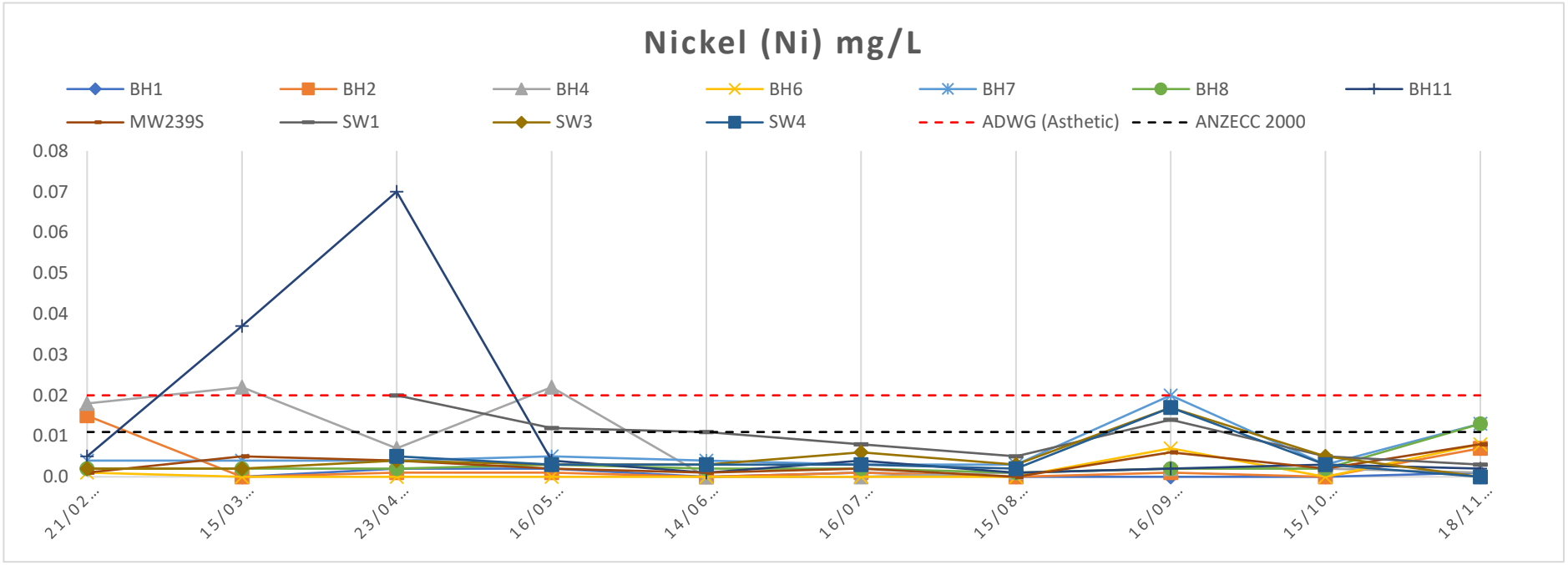
ATTACHMENT B: TREND DATA

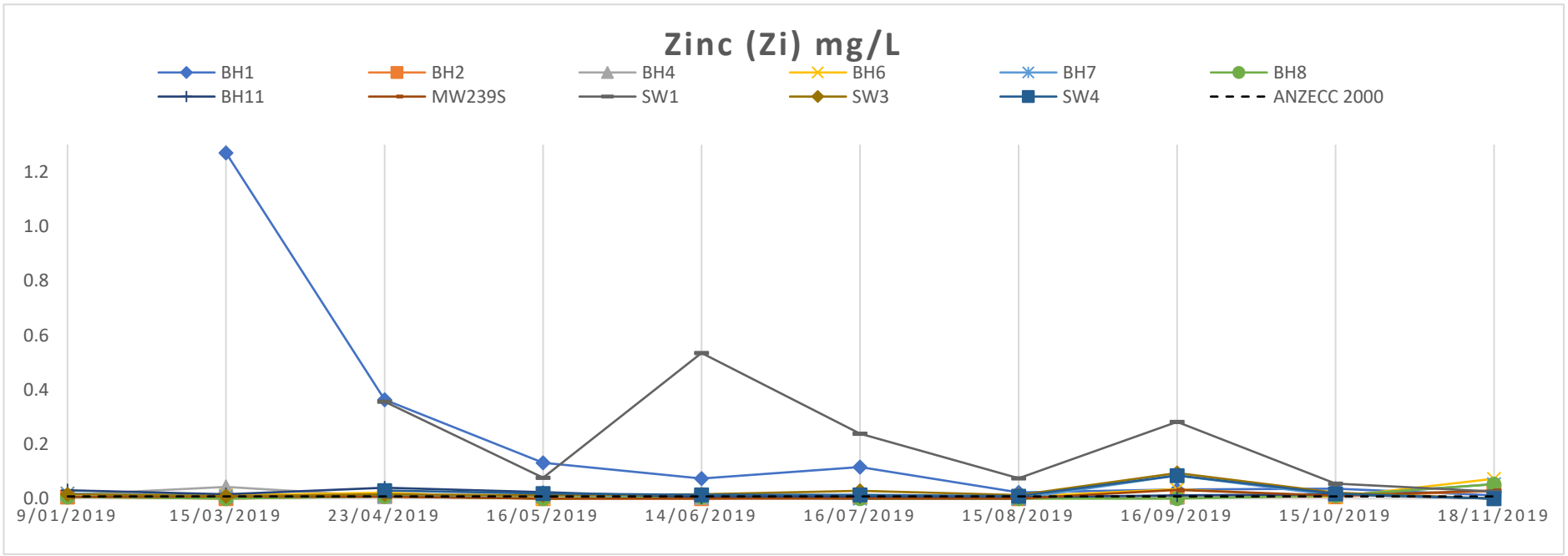

Monthly Rainfall Totals (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
45
18
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Rainfall
Mean

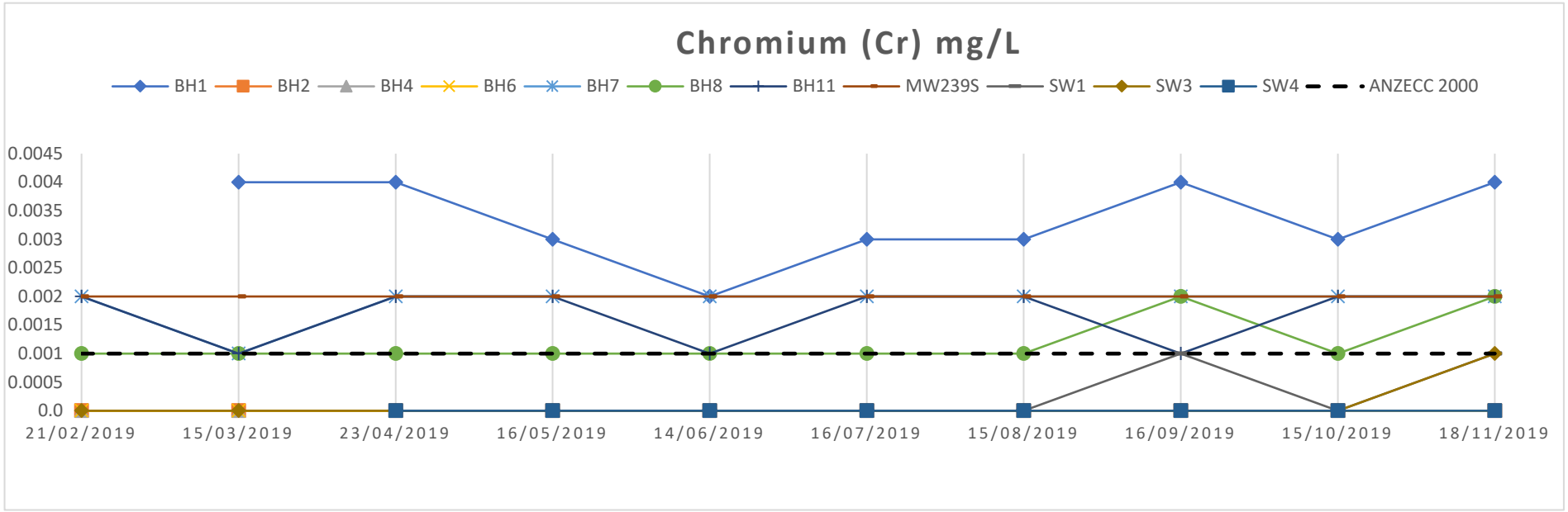

Groundwater Elevation (mAHD)
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
4
3.5
3
2.5
2
1.5
1
0.5
0
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
MW239S
MW239D

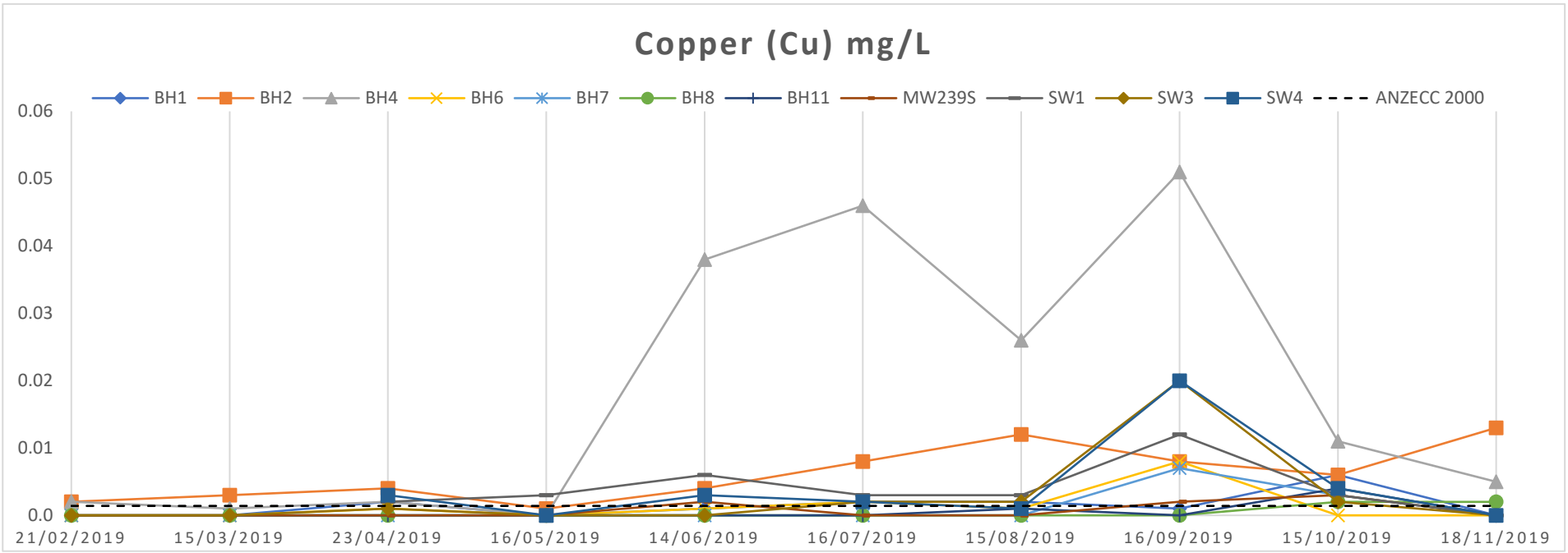

Field EC (µS/cm)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
2000
1800
1600
1400
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

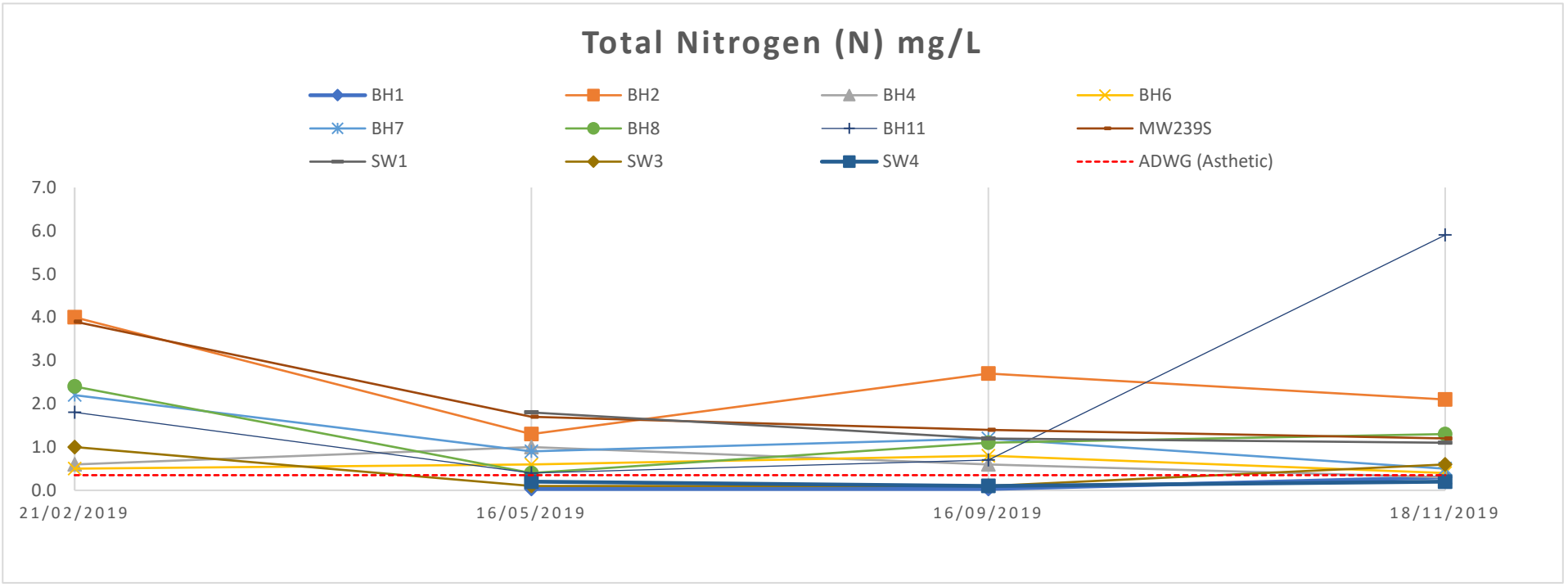

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8.0
6.0
4.0
2.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

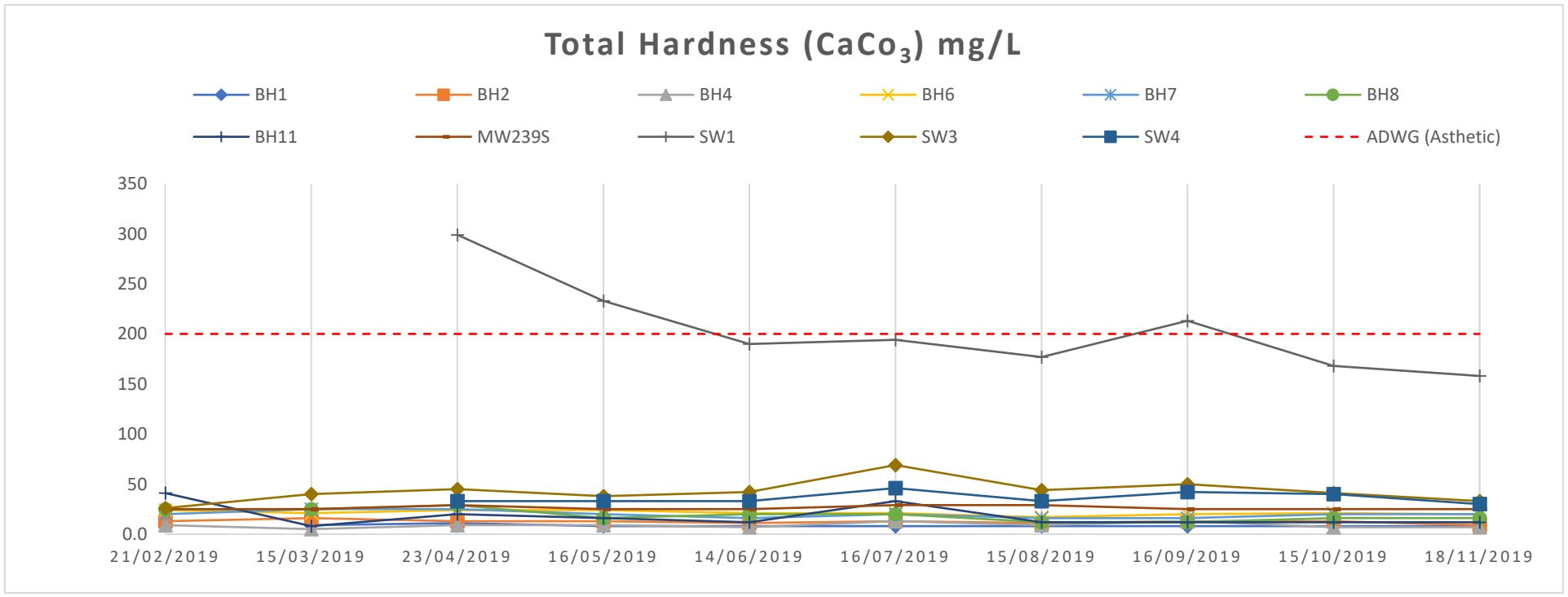

Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02...
15/03...
23/04...
16/05...
14/06...
16/07...
15/08...
16/09...
15/10...
18/11...

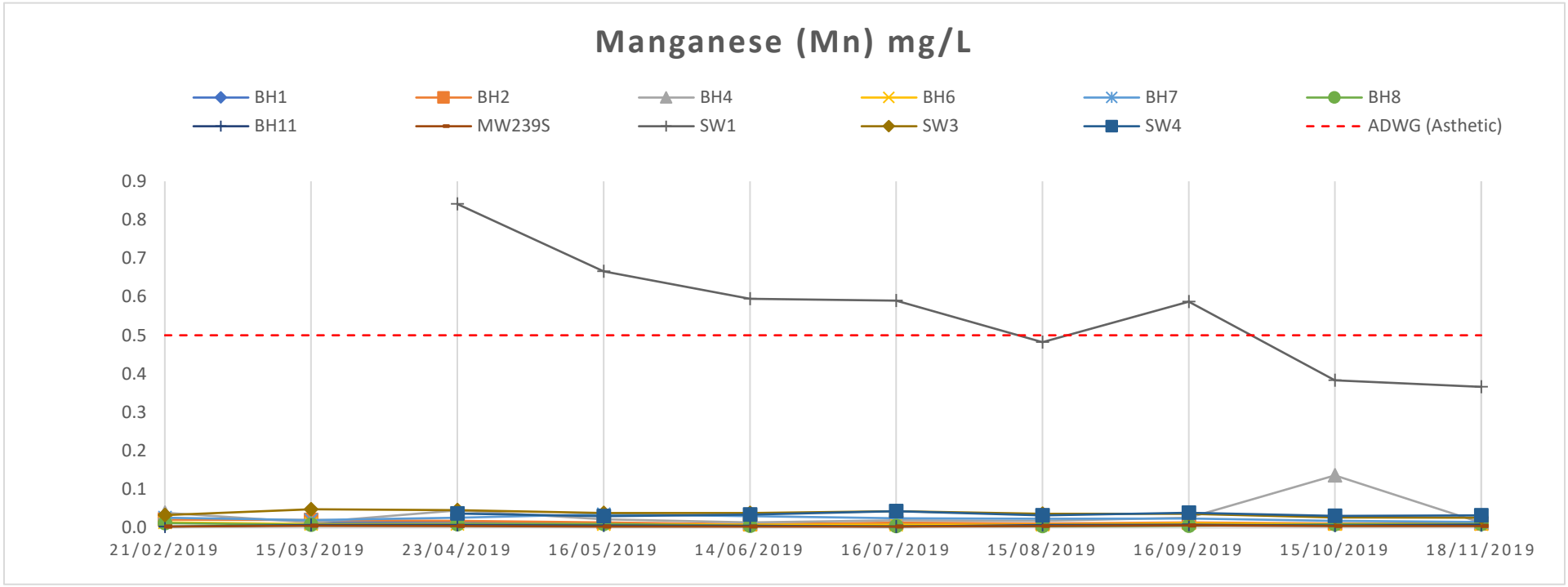

Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1.0
0.8
0.6
0.4
0.2
0.0
9/01/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

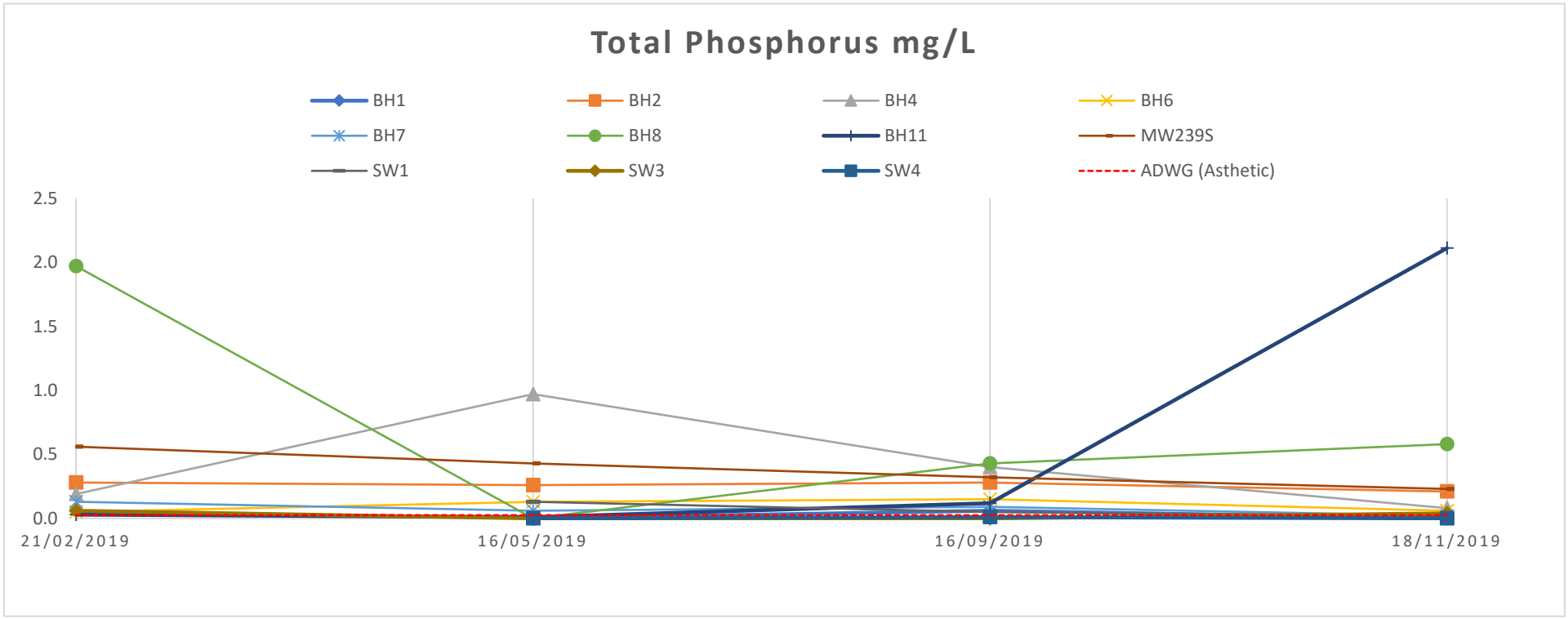

Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

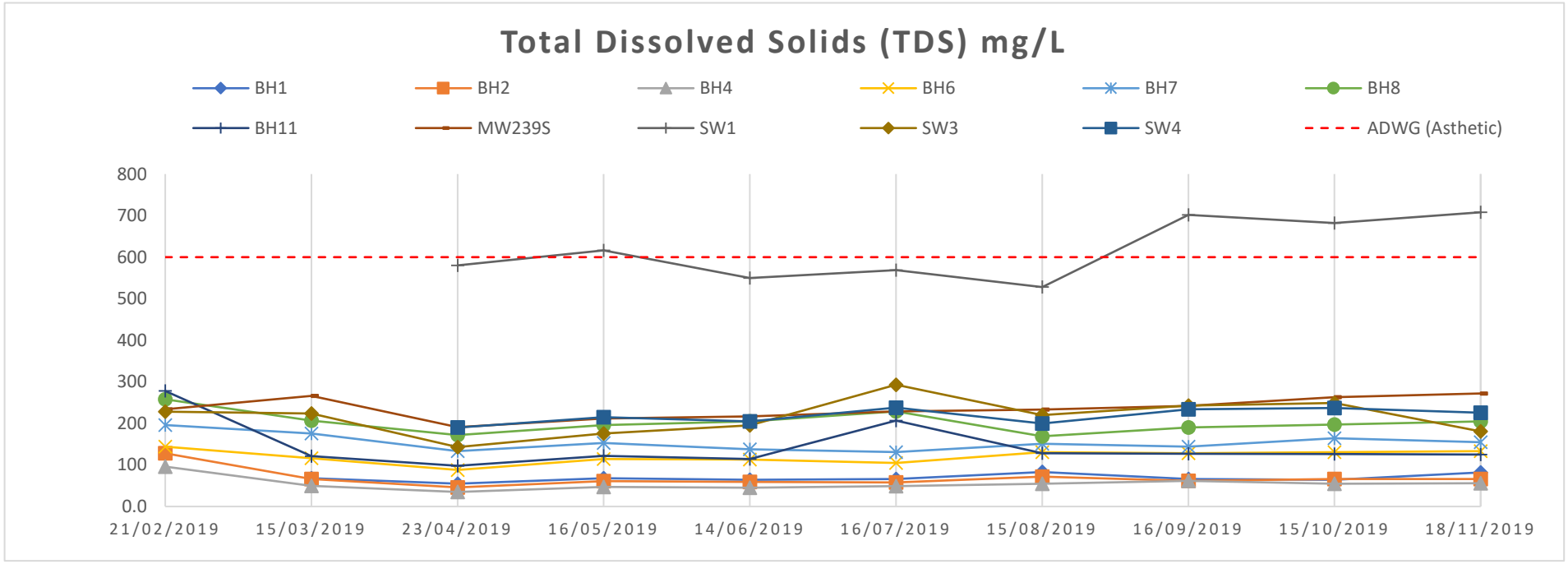

Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

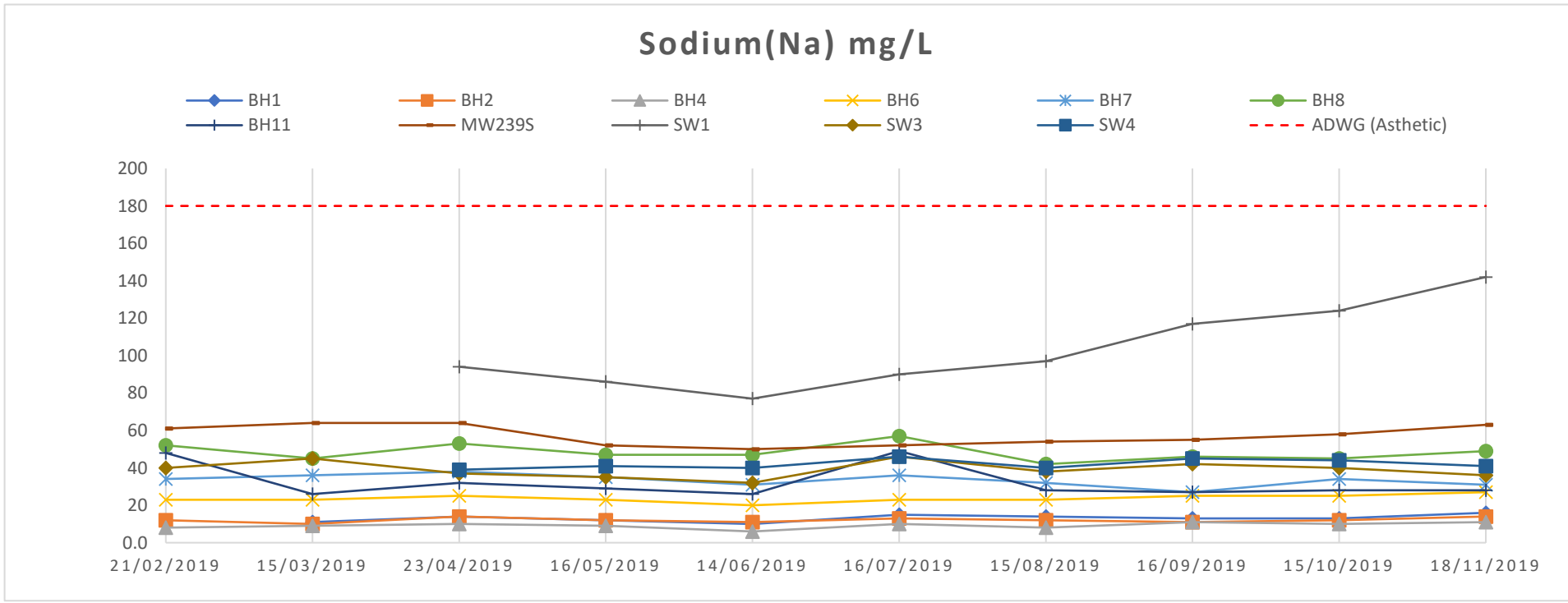

Total Nitrogen (N) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
16/05/2019
16/09/2019
18/11/2019

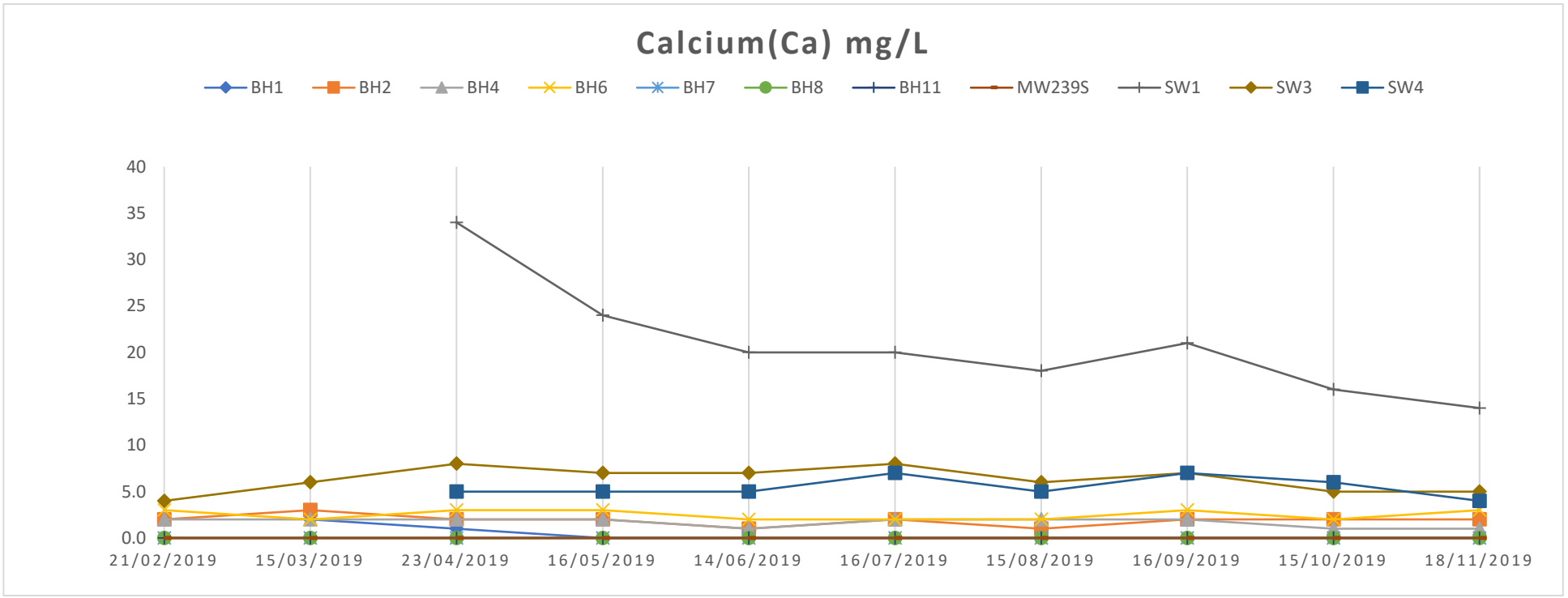

Total Hardness ($CaCo_3$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

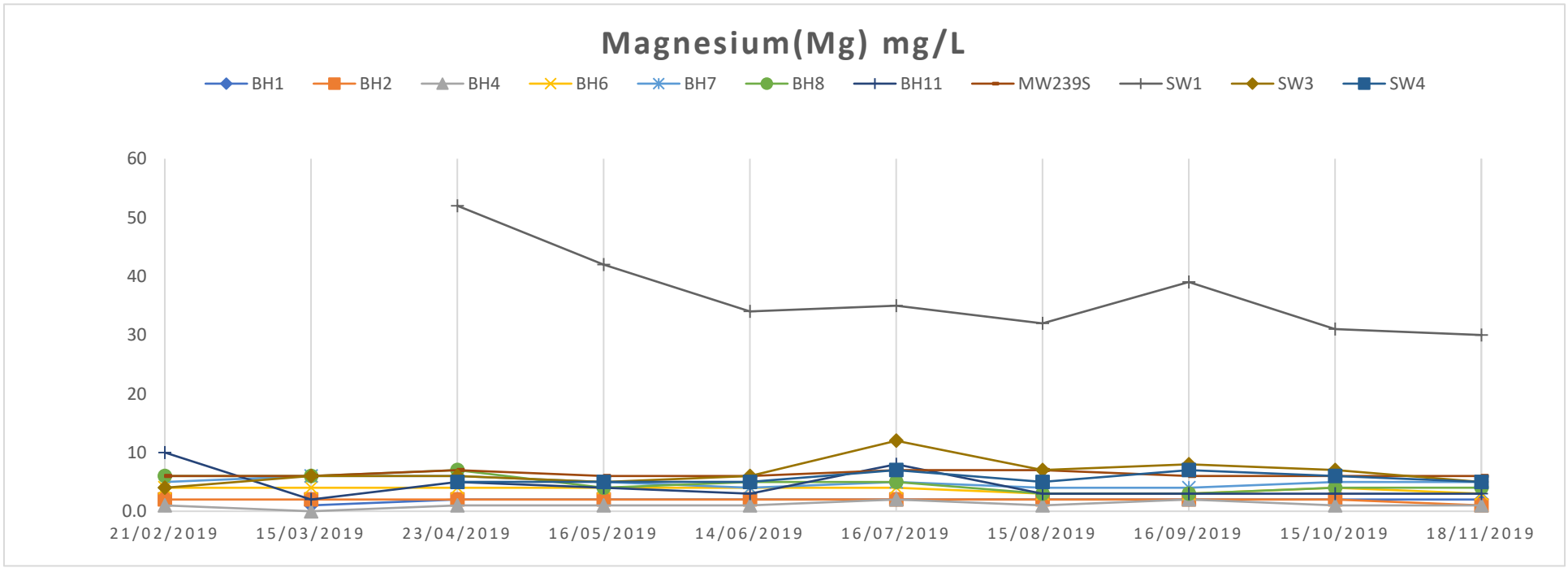

Manganese (Mn) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

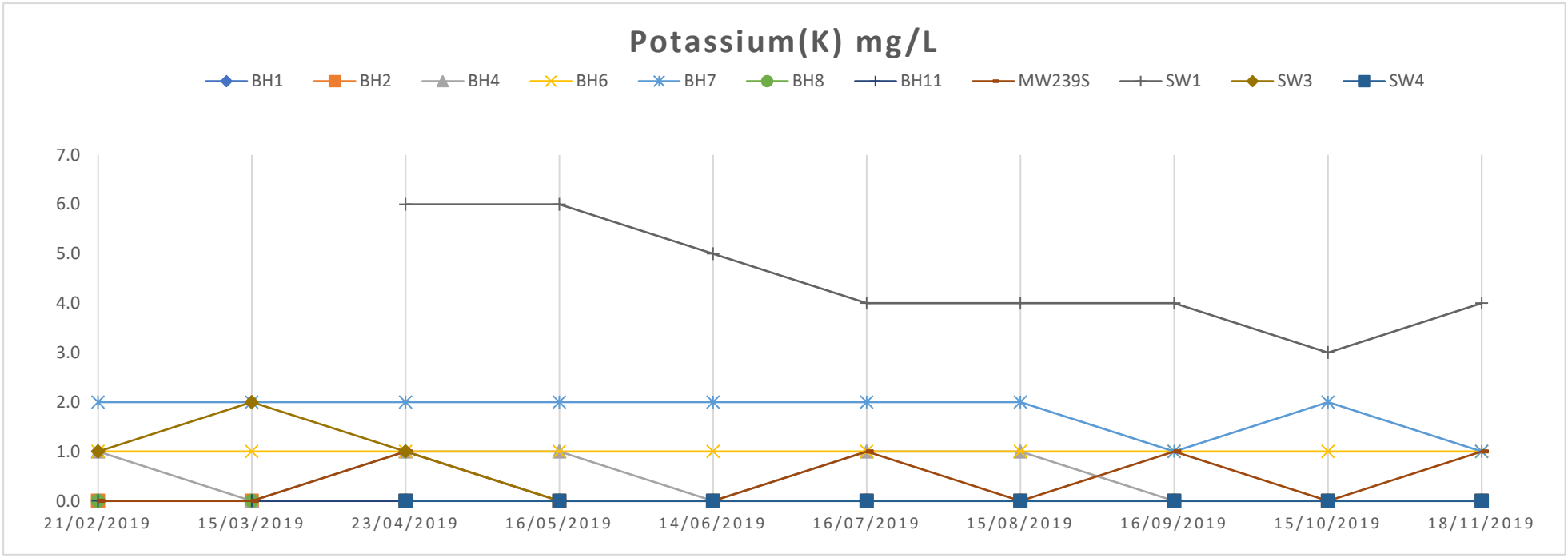

Total Phosphorus mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
2.5
2.0
1.5
1.0
0.5
0.0
21/02/2019
16/05/2019
16/09/2019
18/11/2019

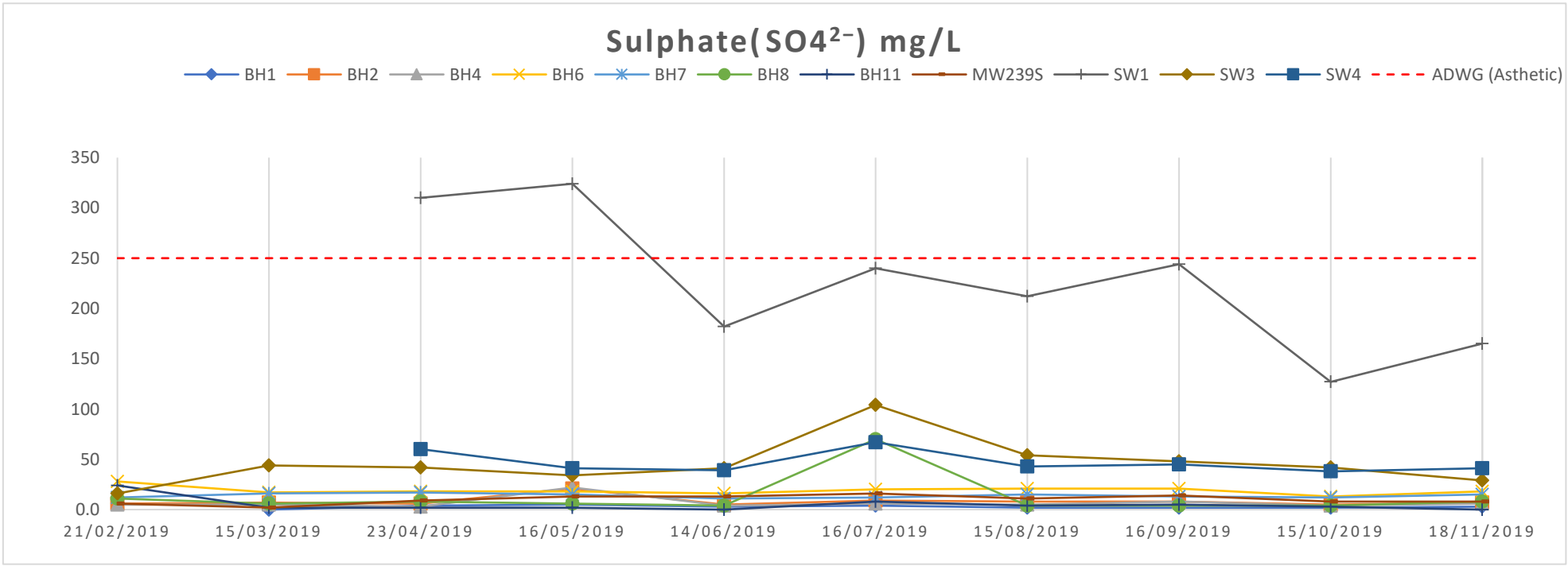

Total Dissolved Solids (TDS) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
800
700
600
500
400
300
200
100
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

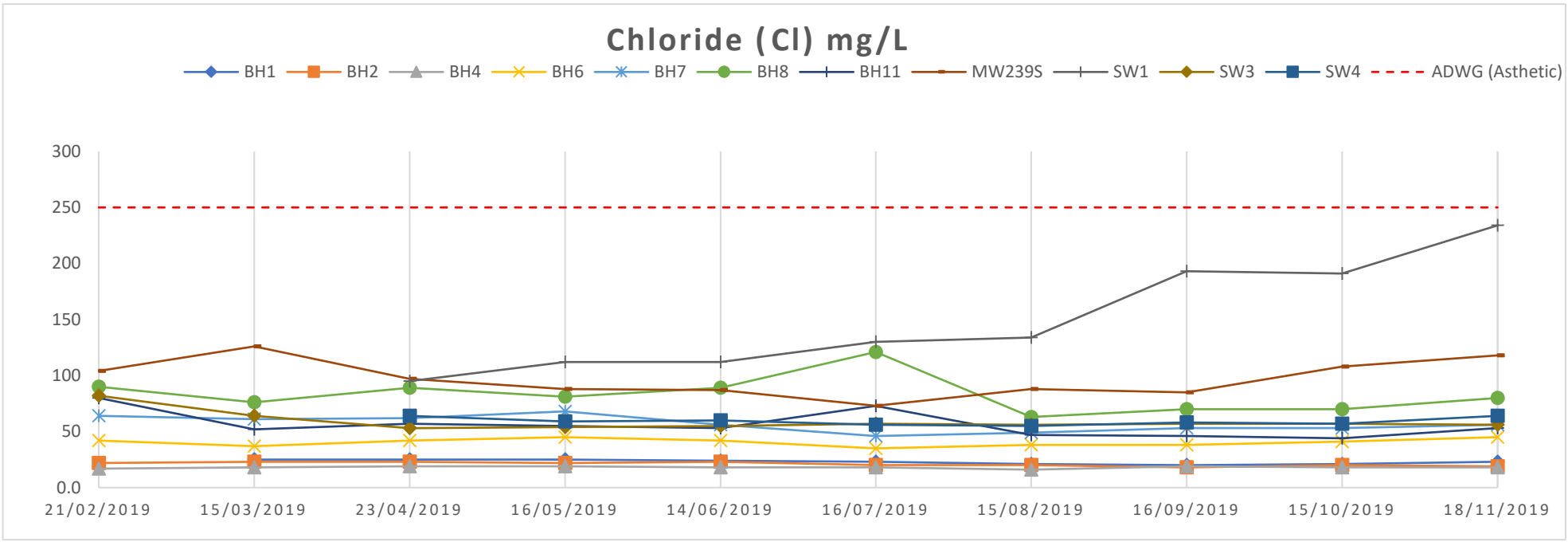

Sodium(Na) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
200
180
160
140
120
100
80
60
40
20
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

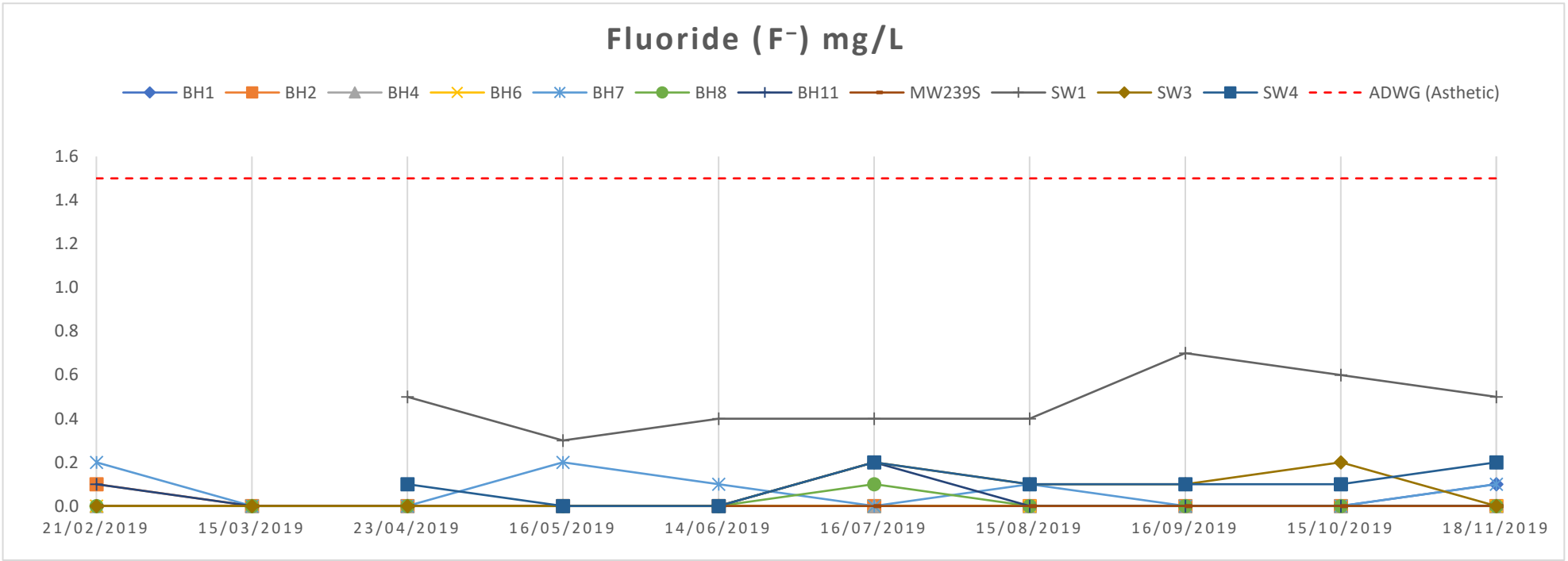

Calcium(Ca) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
40
35
30
25
20
15
10
5.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

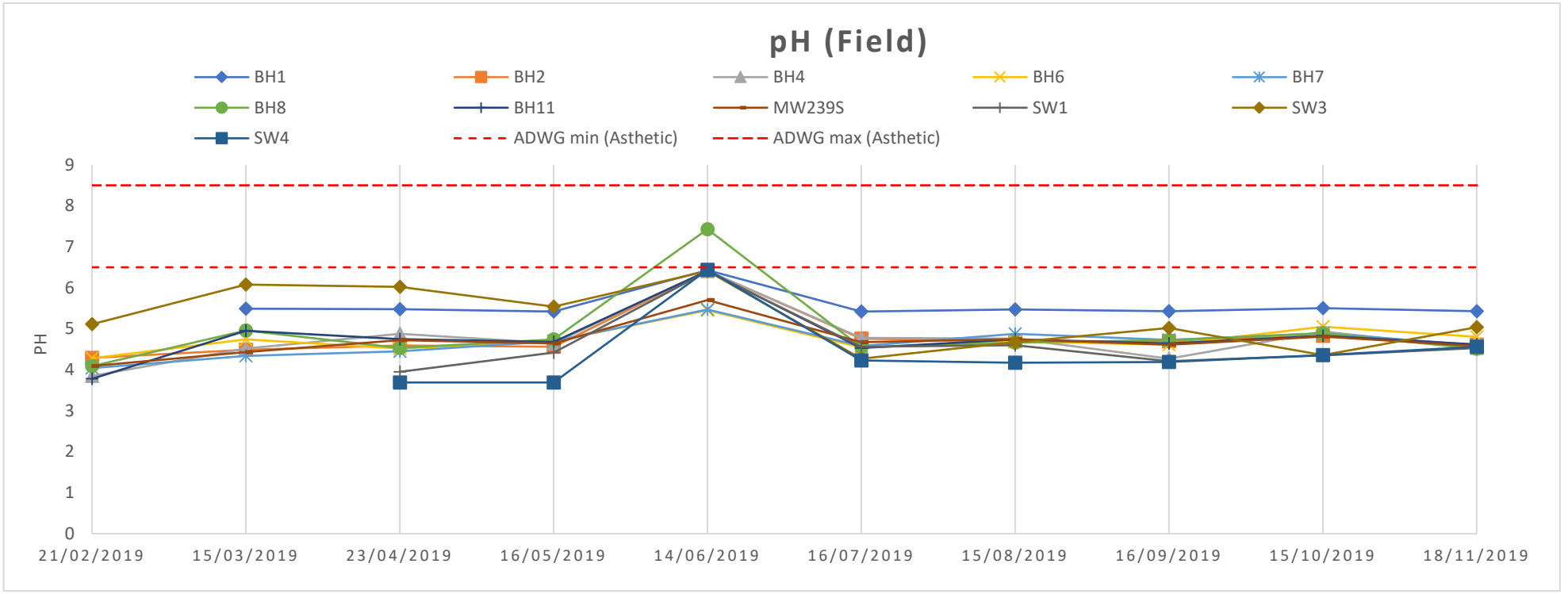

Magnesium(Mg) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
60
50
40
30
20
10
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019


Potassium(K) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019


Sulphate(SO4²⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019


Chloride (Cl) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019


Fluoride (F⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019


pH (Field)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
PH
9
8
7
6
5
4
3
2
1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019

APPENDIX B11: DECEMBER 2019

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NEWCASTLE OFFICE

26 January 2020
Document Ref: NCA19R104403

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – December 2019 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the December 2019 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The December monitoring round was a monthly monitoring event and included gauging of all available monitoring wells (a total of 13 wells) and sampling from 8 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled and BH9 and BH10 were dry) including additional analytical parameters and sampling at one surface water location (all other surface water locations were dry).

2. SITE WORK

The monthly monitoring round was conducted on 17 December 2019. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in trends as outlined in **Appendix B**.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The December 2019 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 has now been decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling from 1 location (SW1, SW2 and SW4 were dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Monthly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	9	0	0	0	0
Hydrocarbons**	9	0	0	1	1
Metals***	9	0	0	1	1
Iron (dissolved)	9	0	0	1	1
Total Dissolved Solids (TDS)	9	0	0	0	0
Total Suspended Solids (TSS)	9	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Fluoride, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Selenium (Se), Vanadium (V), Zinc (Zn) - note sampling for Iron and no nickel

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.558	2.028	8.28	Slight cloudy brown, no odour
BH2	7.79	5.936	1.854	9.03	Dark brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH4	3.06	2.051	1.009	6.11	Slight cloudy brown, no odour
BH5	7.36	6.143	1.217	8.8	No odour - No sample taken.
BH6	3.62	2.009	1.611	4.62	Mostly clear, slight sulfur odour
BH7	2.98	1.989	0.991	4.61	Cloudy brown, slight sulfur odour.
BH8	3.88	2.778	1.102	6.28	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.859	2.771	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.076	1.594	8.2	No sample taken.
MW239S	3.04	1.648	1.392	4.06	Cloudy brown, sulfur odour
MW239D	3.04	1.626	1.414	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	Dry		N/A	Location was dry
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	Dry		N/A	Small amount of standing water
SW04*	N/A	Dry		N/A	Location was dry

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1225	20.53	163	6.12	15.2
BH02	1200	20.13	131	5.38	178
BH04	1145	20.93	109	6.49	174
BH06	1345	21.96	256	5.52	-86.2
BH07	1400	21.87	292	5.93	-92.6
BH08	1430	22.05	995	6.16	-96.8
BH11	1300	20.55	239	5.42	-60.7
MW239S	1315	20.33	523	5.64	-104.7
SW03	1000	20.00	440	5.69	29.3

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean rainfall totals, groundwater elevation (mAHD), field electrical conductivity (µs/cm), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness,

manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium, potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	9	9	65	No	Similar
	Sulphate	1	9	5	25	No	Similar
	Chloride	1	9	16	127	No	Similar
	Fluoride	0.1	9	<0.1	<0.1	No	Similar
	Reactive [3] Phosphorous	0.01	0	-	-	-	-
	Total Phosphorous [3]	0.01	0	-	-	-	-
	Nitrite [3]	0.01	0	-	-	-	-
	Nitrate [3]	0.01	0	-	-	-	-
	Ammonia [3]	0.01	0	-	-	-	-
	Total Nitrogen [3]	0.1	0	-	-	-	-
	Total Hardness	1	9	7.0	39	No	Similar
	Total Dissolved Solids	1	9	55	285	No	Similar
	pH	0.01	9	5.01	6.05	All outside ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	9	<0.001	<0.001	No	Similar
	B	0.05	9	<0.005	0.06	No	Similar
	Ba	0.001	9	0.001	0.041	No	Similar
	Be	0.001	9	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	9	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Cr	0.005-0.1	9	<0.001	0.003	7 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH7, BH8, BH11, MW239S and SW3)	Similar
	Co	0.001	9	<0.001	0.001	No	Similar
	Cu	0.001	9	<0.001	0.008	5 above ANZECC 2000 Trigger Values[2] (BH2, BH4, BH6, BH8 & BH11)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	9	<0.05	8.48	7 above NHMRC ADWG 6 aesthetics (BH1, BH6, BH7, BH8, BH11, MW239S & SW3)	Similar
	Mn	0.001	9	0.001	0.026	No	Similar
	Ni	0.001	9	<0.001	0.003	No	General decrease at groundwater locations.
	Pb	0.005-0.1	9	<0.001	<0.001	No	Similar
	Se	0.005-0.1	9	<0.01	<0.01	No	Similar
	V	0.005-0.1	9	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	9	0.006	0.028	1 above ANZECC 2000 Trigger Values[2] (BH1)	General decrease at most groundwater locations.
	Hg	0.0001	9	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	9	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	9	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	9	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	9	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	9	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	9	<0.02	<0.02	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	9	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	9	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	9	<0.002	<0.002	No	Similar
	Naphthalene	0.001	9	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	0.00019	No	6:2 Fluorotelomer sulfonic acid reported in BH 6 for first time
	PFDS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.
[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater
National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018
[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in November than the mean leading up to the December monitoring event. December rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for December 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0
12th	3.0	0	0	0	0	0	0	0	0	23	0	0
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0
14th	0	0	0	0.2	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	0
17th	0	0	59.4	1.4	0	0	0	0	16.8	0	0	0
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	
31st	0		6.6		0		10	67.4				
Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**98.6**	**75.4**	**44.8**	**51.8**	
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**73.2**	**60.6**	**73.5**	**82.3**	**78.6**

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

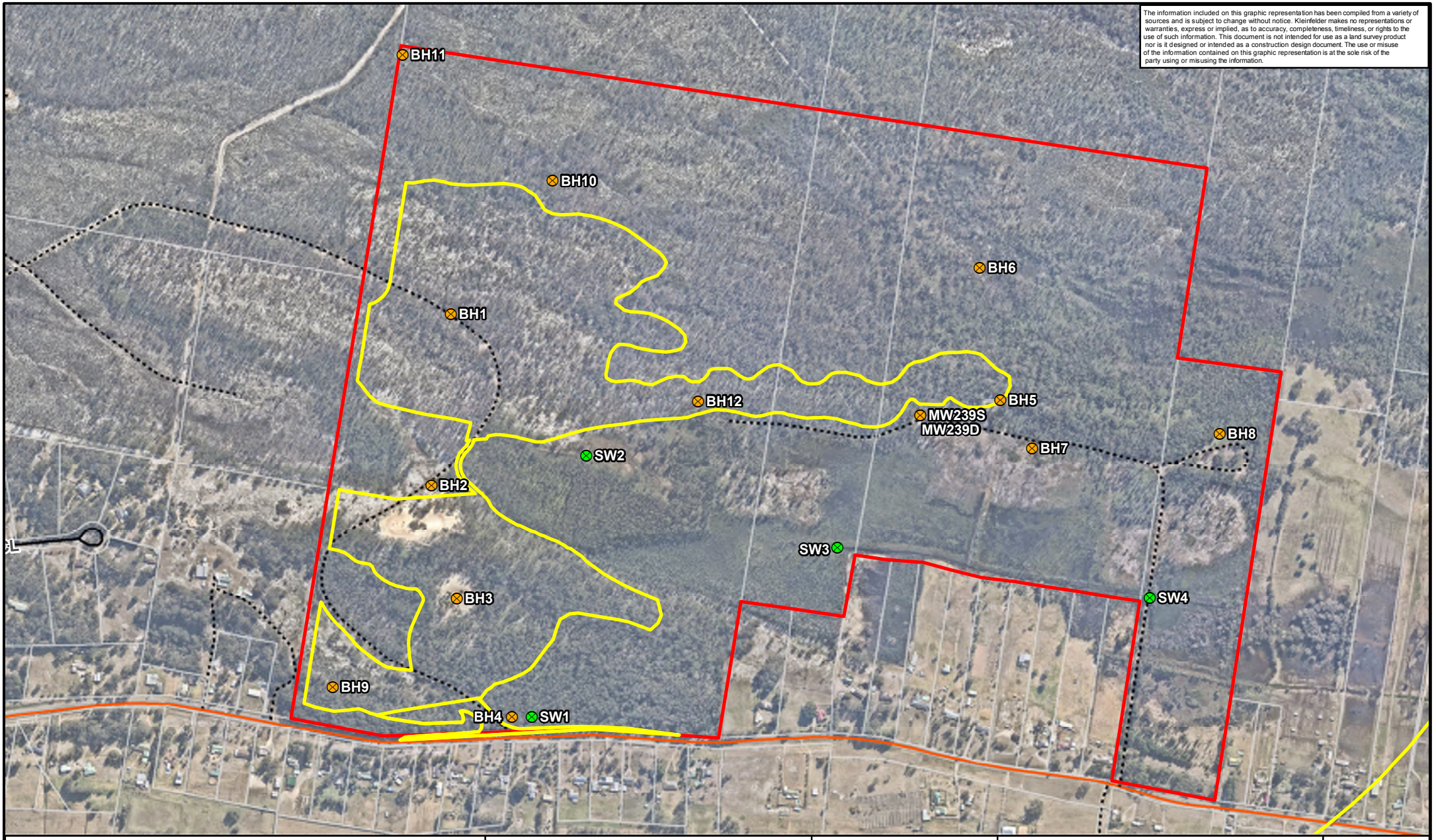
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce
DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water Monitoring Plan

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

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DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20	< 100	< 100	**140**	< 100	**140**
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH8	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals															
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.006**	**4.32**	< 0.001	**0.007**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.037**
	18-Nov-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**11**	< 0.001	**0.008**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.012**
	17-Dec-19	<0.001	**0.002**	<0.001	<0.05	<0.0001	**0.003**	<0.001	0.001	**8.48**	<0.001	**0.009**	<0.0001	<0.001	<0.01	<0.01	**0.028**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.004**	**0.74**	< 0.001	**0.006**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	18-Nov-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.95**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.004**	<0.001	**0.06**	<0.0001	**0.002**	<0.001	**0.002**	**1**	<0.001	**0.008**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.006**	**0.46**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	18-Nov-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.013**	**0.08**	< 0.001	**0.011**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.028**
	17-Dec-19	<0.001	**0.004**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.006**	**0.1**	<0.001	**0.012**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
	15-Oct-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.011**	**0.31**	< 0.001	**0.136**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.014**
	18-Nov-19	< 0.001	**0.011**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.005**	< 0.05	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.012**	<0.001	**0.06**	<0.0001	0.001	<0.001	**0.008**	<0.05	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.005**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
	15-Oct-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.95**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.006**
	18-Nov-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.58**	< 0.001	**0.009**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.073**
	17-Dec-19	<0.001	**0.026**	<0.001	**0.05**	<0.0001	**0.001**	<0.001	**0.003**	**1.78**	<0.001	**0.007**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.009**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	**0.003**	**1.32**	< 0.001	**0.018**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.016**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.1**	< 0.001	**0.015**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.009**	<0.001	**0.06**	<0.0001	**0.002**	**0.001**	<0.001	**0.98**	<0.001	**0.011**	<0.0001	**0.003**	<0.01	<0.01	**0.007**
BH8	21-Feb-19	**0.001 ***	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	**0.002**	**2.08**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**2.49**	< 0.001	**0.01**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.007**	<0.001	**0.05**	<0.0001	**0.002**	<0.001	**0.003**	**3.02**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.007**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.003**	**0.68**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.1**	< 0.001	**0.004**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.03**
	17-Dec-19	<0.001	**0.008**	<0.001	<0.05	<0.0001	**0.003**	<0.001	**0.001**	**1.33**	<0.001	**0.003**	<0.0001	**0.002**	<0.01	<0.01	<0.005
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
	15-Oct-19	< 0.001	**0.036**	< 0.001	**0.07**	< 0.0001	< 0.001	**0.005**	**0.003**	**1.61**	< 0.001	**0.383**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.055**
	18-Nov-19	< 0.001	**0.042**	< 0.001	**0.11**	< 0.0001	**0.001**	**0.003**	< 0.001	**1.14**	< 0.001	**0.366**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.026**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001 ***	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
	15-Oct-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.005**	**0.002**	**1.7**	< 0.001	**0.027**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.022**
	18-Nov-19	< 0.001	**0.031**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.026**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.041**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.003**	**1.42**	<0.001	**0.026**	<0.0001	**0.001**	<0.01	<0.01	<0.005
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.037**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.004**	**0.66**	< 0.001	**0.031**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.018**
	18-Nov-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**6.32**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids								
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanes ulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56				
HEPA NEMP 2018***						0.00023						19				
HEPA NEMP 2018[4]												5.6				
Sample Name	Sample Date															
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	**0.02**	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
MW239S	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03 ***	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonamides									(n:2) Fluorotelomer Sulfonic Acids			
		Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)
LOR		0.02	0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6														
HEPA NEMP 2018***														
HEPA NEMP 2018[4]														
Sample Name	Sample Date													
BH11	21-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH2	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH3	21-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH4	21-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Mar-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	23-Apr-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Jun-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Jul-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Aug-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	25-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Oct-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	17-Dec-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH5	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH6	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Mar-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	23-Apr-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Jun-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Jul-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Aug-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Oct-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	17-Dec-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	**0.19**	< 0.05	< 0.05
BH7	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Mar-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	23-Apr-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Jun-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Jul-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Aug-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Oct-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	17-Dec-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
BH8	21-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Mar-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	23-Apr-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	14-Jun-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Jul-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Aug-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	15-Oct-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	17-Dec-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
MW239S	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
SW1	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
SW3	22-Feb-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
SW4	16-May-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	16-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	25-Sep-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05
	18-Nov-19	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05

Notes:
- - Not analysed
< - Less than laboratory limit of reporti
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Sum of PFAS		
		Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
LOR		0.01	0.01	0.01
Units		µg/L	µg/L	µg/L
NHMRC ADWG 6		0.07		
HEPA NEMP 2018***				
HEPA NEMP 2018[4]		0.7		
Sample Name	Sample Date			
BH11	21-Feb-19	< 0.01	< 0.01	< 0.01
BH2	22-Feb-19	< 0.01	< 0.01	< 0.01
BH3	21-Feb-19	< 0.01	< 0.01	< 0.01
BH4	21-Feb-19	< 0.01	< 0.01	< 0.01
	15-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	**0.02**
	25-Sep-19	< 0.01	< 0.01	**0.02**
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
BH5	22-Feb-19	< 0.01	< 0.01	< 0.01
BH6	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	**0.19**
BH7	22-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
BH8	21-Feb-19	< 0.01	< 0.01	< 0.01
	14-Mar-19	< 0.01	< 0.01	< 0.01
	23-Apr-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	14-Jun-19	< 0.01	< 0.01	< 0.01
	16-Jul-19	< 0.01	< 0.01	< 0.01
	15-Aug-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	15-Oct-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
	17-Dec-19	< 0.01	< 0.01	< 0.01
MW239S	22-Feb-19	< 0.01	< 0.01	< 0.01
SW1	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW3	22-Feb-19	< 0.01	< 0.01	< 0.01
	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	< 0.01	< 0.01	< 0.01
	18-Nov-19	< 0.01	< 0.01	< 0.01
SW4	16-May-19	< 0.01	< 0.01	< 0.01
	16-Sep-19	**0.03 ***	**0.01**	**0.01**
	25-Sep-19	**0.05**	**0.05**	**0.05**
	18-Nov-19	< 0.01	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporti
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*			
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]				
Sample Name	Sample Date																	
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19
	17-Dec-19	14	<1	2	<1	5	23	<0.1									0.77	1.05
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5
	17-Dec-19	26	<1	4	<1	<1	48	<0.1									1.46	1.39
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68
	17-Dec-19	13	2	2	<1	8	17	<0.1									0.83	0.69
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63
	17-Dec-19	9	1	1	1	6	16	<0.1									0.55	0.64
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64
	17-Dec-19	26	2	4	1	16	42	<0.1									1.58	1.62
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89
	17-Dec-19	26	<1	5	1	15	44	<0.1									1.57	1.59
	21-Feb-19	52	< 1.0	6.0	< 1.0	11	90	< 0.1	< 0.01	1.97	< 0.01	< 0.01	< 0.01	0.5	2.4	2.4	2.76	2.77

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

		Alkalinity						Inorganics		
Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
	0.01	1	1	1	1	1	1	1	10	0.01
%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
							125-2200			6.5 - 8.0*
						200[3]		600[3]		6.5-8.5[3]
-	-	**9.0**	< 1.0	< 1.0	**9.0**	**9.0**	**104**	**68**	**129**	**5.67**
-	-	**10**	< 1.0	< 1.0	**10**	**11**	**84**	**55**	**97**	**5.83**
-	**1.7**	**10**	< 1.0	< 1.0	**10**	**8.0**	**105**	**68**	**164**	**5.82**
-	-	**10**	< 1.0	< 1.0	**10**	**8.0**	**99**	**64**	**72**	**5.52**
-	-	**11**	< 1.0	< 1.0	**11**	**8.0**	**102**	**66**	**84**	**5.62**
-	-	**14**	< 1.0	< 1.0	**14**	**8.0**	**128**	**83**	**82**	**6.22**
-	**1.84**	**8.0**	< 1.0	< 1.0	**8.0**	**8.0**	**102**	**66**	**88**	**5.44**
-	-	**4.0**	< 1.0	< 1.0	**4.0**	**8.0**	**98**	**64**	-	**5.5**
-	**2.26**	**24**	< 1.0	< 1.0	**24**	**8.0**	**126**	**82**	-	**6.29**
		15	<1	<1	**15**	**8**	**118**	**77**		**6.05**
-	**3.21**	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**346**	**278**	-	**4.67**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**8.0**	**186**	**121**	**144**	**4.82**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**150**	**98**	**135**	**4.99**
-	**3.0**	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**188**	**122**	**216**	**4.91**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**175**	**114**	**107**	**4.84**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**318**	**207**	**192**	**4.68**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**197**	**128**	**135**	**4.88**
-	**3.18**	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**195**	**127**	**140**	**4.66**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**194**	**126**	-	**4.92**
-	**3.3**	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**193**	**125**	-	**5.12**
		2	<1	<1	**2**	**16**	**196**	**127**		**5.03**
-	**1.44**	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**91**	**128**	-	**4.87**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**101**	**66**	**90**	**4.71**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**70**	**46**	**84**	**4.82**
-	**1.44**	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**94**	**61**	**144**	**4.85**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**91**	**59**	**51**	**4.76**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**90**	**58**	**63**	**4.84**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**110**	**72**	**61**	**5.2**
-	**1.32**	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**96**	**62**	**60**	**4.72**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**102**	**66**	-	**5.06**
-	**2.02**	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**102**	**66**	-	**5.47**
		2	<1	<1	**2**	**13**	**106**	**69**		**5.43**
-	**0.46**	**9.0**	< 1.0	< 1.0	**9.0**	**14**	**60**	**438**	-	**5.55**
-	**1.15**	**6.0**	< 1.0	< 1.0	**6.0**	**9.0**	**73**	**96**	-	**5.4**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**5.0**	**77**	**50**	**70**	**5.12**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**54**	**35**	**61**	**5.05**
-	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**73**	**47**	**100**	**4.99**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**69**	**45**	**36**	**4.84**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**75**	**49**	**42**	**4.96**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**85**	**55**	**49**	**5.01**
-	**1.32**	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**95**	**62**	**58**	**4.83**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**85**	**55**	-	**4.93**
-	**1.86**	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**86**	**56**	-	**5.34**
		3	<1	<1	**3**	**7**	**85**	**55**		**5.44**
-	**3.59**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**250**	**211**	-	**4.87**
-	**2.49**	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**177**	**144**	-	**4.37**
-	-	**2.0**	< 1.0	< 1.0	**2.0**	**21**	**179**	**116**	**146**	**4.95**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**136**	**88**	**115**	**4.64**
-	**2.04**	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**175**	**114**	**214**	**4.88**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**174**	**113**	**90**	**4.82**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**161**	**105**	**82**	**4.73**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**17**	**201**	**131**	**104**	**4.87**
-	**2.44**	**2.0**	< 1.0	< 1.0	**2.0**	**20**	**197**	**128**	**124**	**4.68**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**202**	**131**	-	**5.17**
-	**2.64**	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**204**	**133**	-	**5.32**
		5	<1	<1	5	**21**	**207**	**134**		**5.58**
-	**3.16**	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**213**	**196**	-	**4.76**
1.37	-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**271**	**176**	**212**	**4.73**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**205**	**133**	**185**	**4.51**
-	**3.26**	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**235**	**153**	**310**	**4.87**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**213**	**138**	**145**	**4.91**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**202**	**131**	**164**	**5.0**
-	-	**8.0**	< 1.0	< 1.0	**8.0**	**16**	**232**	**151**	**168**	**5.53**
-	**2.79**	**5.0**	< 1.0	< 1.0	**5.0**	**16**	**222**	**144**	**181**	**5.07**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**252**	**164**	-	**4.95**
-	**2.89**	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**239**	**155**	-	**4.97**
		2	<1	<1	**2**	**20**	**210**	**136**		**5.14**
-	**4.44**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**352**	**258**	-	**4.46**

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*			
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]				
BH8	14-Mar-19	**45**	< 1.0	**6.0**	< 1.0	**6.0**	**76**	< 0.1	-	-	-	-	-	-	-	-	**2.45**	**2.27**
	23-Apr-19	**53**	< 1.0	**7.0**	< 1.0	**8.0**	**89**	< 0.1	-	-	-	-	-	-	-	-	**2.88**	**2.68**
	16-May-19	**47**	< 1.0	**4.0**	< 1.0	**6.0**	**81**	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.12**	**0.4**	**0.4**	**2.37**	**2.43**
	14-Jun-19	**47**	< 1.0	**5.0**	< 1.0	**4.0**	**89**	< 0.1	-	-	-	-	-	-	-	-	**2.46**	**2.59**
	16-Jul-19	**57**	< 1.0	**5.0**	< 1.0	**70**	**121**	**0.1**	-	-	-	-	-	-	-	-	**2.89**	**4.87**
	15-Aug-19	**42**	< 1.0	**3.0**	< 1.0	**4.0**	**63**	< 0.1	-	-	-	-	-	-	-	-	**2.07**	**1.86**
	16-Sep-19	**46**	< 1.0	**3.0**	< 1.0	**4.0**	**70**	< 0.1	< 0.01	**0.43**	< 0.01	< 0.01	< 0.01	**0.13**	**1.1**	**1.1**	**2.25**	**2.06**
	15-Oct-19	**45**	< 1.0	**4.0**	< 1.0	**4.0**	**70**	< 0.1	-	-	-	-	-	-	-	-	**2.29**	**2.06**
	18-Nov-19	**49**	< 1.0	**4.0**	< 1.0	**8.0**	**80**	< 0.1	< 0.01	**0.58**	< 0.01	**0.01**	**0.01**	**0.17**	**1.3**	**1.3**	**2.46**	**2.42**
	17-Dec-19	**50**	<1	**4**	<1	**10**	**75**	<0.1									**2.5**	**2.36**
MW239S	22-Feb-19	**61**	< 1.0	**6.0**	< 1.0	**6.0**	**104**	< 0.1	< 0.01	**0.56**	< 0.01	< 0.01	< 0.01	**0.18**	**3.9**	**3.9**	**3.15**	**3.06**
	14-Mar-19	**64**	< 1.0	**6.0**	< 1.0	**2.0**	**126**	< 0.1	-	-	-	-	-	-	-	-	**3.28**	**3.64**
	23-Apr-19	**64**	< 1.0	**7.0**	**1.0**	**9.0**	**97**	< 0.1	-	-	-	-	-	-	-	-	**3.38**	**2.92**
	16-May-19	**52**	< 1.0	**6.0**	< 1.0	**13**	**88**	< 0.1	< 0.01	**0.43**	< 0.01	< 0.01	< 0.01	**0.09**	**1.7**	**1.7**	**2.76**	**2.75**
	14-Jun-19	**50**	< 1.0	**6.0**	< 1.0	**13**	**87**	< 0.1	-	-	-	-	-	-	-	-	**2.67**	**2.86**
	16-Jul-19	**52**	< 1.0	**7.0**	**1.0**	**16**	**73**	< 0.1	-	-	-	-	-	-	-	-	**2.86**	**2.39**
	15-Aug-19	**54**	< 1.0	**7.0**	< 1.0	**11**	**88**	< 0.1	-	-	-	-	-	-	-	-	**2.92**	**2.71**
	16-Sep-19	**55**	< 1.0	**6.0**	**1.0**	**14**	**85**	< 0.1	< 0.01	**0.32**	< 0.01	< 0.01	< 0.01	**0.1**	**1.4**	**1.4**	**2.91**	**2.69**
	15-Oct-19	**58**	< 1.0	**6.0**	< 1.0	**8.0**	**108**	< 0.1	-	-	-	-	-	-	-	-	**3.02**	**3.21**
	18-Nov-19	**63**	< 1.0	**6.0**	**1.0**	**8.0**	**118**	< 0.1	< 0.01	**0.23**	< 0.01	< 0.01	< 0.01	**0.17**	**1.2**	**1.2**	**3.26**	**3.5**
	17-Dec-19	**65**	<1	**8**	<1	**6**	**127**	<0.1									**3.48**	**3.75**
SW1	23-Apr-19	**94**	**34**	**52**	**6.0**	**310**	**95**	**0.5**	-	-	-	-	-	-	-	-	**10**	**9.13**
	16-May-19	**86**	**24**	**42**	**6.0**	**324**	**112**	**0.3**	< 0.01	**0.13**	< 0.01	< 0.01	< 0.01	< 0.01	**1.8**	**1.8**	**8.94**	**9.9**
	14-Jun-19	**77**	**20**	**34**	**5.0**	**182**	**112**	**0.4**	-	-	-	-	-	-	-	-	**7.27**	**6.95**
	16-Jul-19	**90**	**20**	**35**	**4.0**	**240**	**130**	**0.4**	-	-	-	-	-	-	-	-	**7.9**	**8.66**
	15-Aug-19	**97**	**18**	**32**	**4.0**	**212**	**134**	**0.4**	-	-	-	-	-	-	-	-	**7.85**	**8.19**
	16-Sep-19	**117**	**21**	**39**	**4.0**	**244**	**193**	**0.7**	< 0.01	**0.05**	< 0.01	**0.02**	**0.02**	< 0.01	**1.2**	**1.2**	**9.45**	**11**
	15-Oct-19	**124**	**16**	**31**	**3.0**	**127**	**191**	**0.6**	-	-	-	-	-	-	-	-	**8.82**	**8.03**
	18-Nov-19	**142**	**14**	**30**	**4.0**	**165**	**234**	**0.5**	< 0.01	**0.02**	< 0.01	< 0.01	< 0.01	**0.03**	**1.1**	**1.1**	**9.45**	**10**
SW3	22-Feb-19	**40**	**4.0**	**4.0**	**1.0**	**16**	**82**	< 0.1	< 0.01	**0.06**	< 0.01	< 0.01	< 0.01	**0.16**	**1.0**	**1.0**	**2.55**	**2.87**
	14-Mar-19	**45**	**6.0**	**6.0**	**2.0**	**44**	**64**	< 0.1	-	-	-	-	-	-	-	-	**2.8**	**2.8**
	23-Apr-19	**37**	**8.0**	**6.0**	**1.0**	**42**	**53**	< 0.1	-	-	-	-	-	-	-	-	**2.53**	**2.37**
	16-May-19	**35**	**7.0**	**5.0**	< 1.0	**34**	**54**	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.1**	**0.1**	**2.28**	**2.25**
	14-Jun-19	**32**	**7.0**	**6.0**	< 1.0	**41**	**55**	< 0.1	-	-	-	-	-	-	-	-	**2.24**	**2.4**
	16-Jul-19	**46**	**8.0**	**12**	< 1.0	**104**	**57**	**0.2**	-	-	-	-	-	-	-	-	**3.39**	**3.77**
	15-Aug-19	**38**	**6.0**	**7.0**	< 1.0	**54**	**56**	**0.1**	-	-	-	-	-	-	-	-	**2.53**	**2.7**
	16-Sep-19	**42**	**7.0**	**8.0**	< 1.0	**48**	**57**	**0.1**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.01**	**0.1**	**0.1**	**2.83**	**2.61**
	15-Oct-19	**40**	**5.0**	**7.0**	< 1.0	**42**	**57**	**0.2**	-	-	-	-	-	-	-	-	**2.56**	**2.48**
	18-Nov-19	**36**	**5.0**	**5.0**	< 1.0	**29**	**56**	< 0.1	< 0.01	**0.04**	< 0.01	**0.01**	**0.01**	**0.03**	**0.6**	**0.6**	**2.23**	**2.18**
	17-Dec-19	**40**	**4**	**7**	**1**	**25**	**57**	<0.1									**2.54**	**2.25**
SW4	23-Apr-19	**39**	**5.0**	**5.0**	< 1.0	**60**	**64**	**0.1**	-	-	-	-	-	-	-	-	**2.36**	**3.05**
	16-May-19	**41**	**5.0**	**5.0**	< 1.0	**41**	**59**	< 0.1	**0.01**	< 0.01	< 0.01	**0.05**	**0.05**	< 0.01	**0.2**	**0.2**	**2.44**	**2.52**
	14-Jun-19	**40**	**5.0**	**5.0**	< 1.0	**39**	**60**	< 0.1	-	-	-	-	-	-	-	-	**2.4**	**2.5**
	16-Jul-19	**46**	**7.0**	**7.0**	< 1.0	**67**	**56**	**0.2**	-	-	-	-	-	-	-	-	**2.93**	**2.97**
	15-Aug-19	**40**	**5.0**	**5.0**	< 1.0	**43**	**55**	**0.1**	-	-	-	-	-	-	-	-	**2.4**	**2.45**
	16-Sep-19	**45**	**7.0**	**6.0**	< 1.0	**45**	**58**	**0.1**	< 0.01	**0.01**	< 0.01	< 0.01	< 0.01	< 0.01	**0.1**	**0.1**	**2.8**	**2.57**
	15-Oct-19	**44**	**6.0**	**6.0**	< 1.0	**38**	**57**	**0.1**	-	-	-	-	-	-	-	-	**2.71**	**2.4**
	18-Nov-19	**41**	**4.0**	**5.0**	< 1.0	**41**	**64**	**0.2**	< 0.01	< 0.01	< 0.01	**0.02**	**0.02**	< 0.01	**0.2**	**0.2**	**2.76**	**2.66**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

		Alkalinity						Inorganics		
Ionic Balance	Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
	0.01	1	1	1	1	1	1	1	10	0.01
%	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
							125-2200			6.5 - 8.0*
						200[3]		600[3]		6.5-8.5[3]
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**319**	**207**	**253**	**4.77**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**264**	**172**	**223**	**4.76**
-	**4.86**	**1.0**	< 1.0	< 1.0	**1.0**	**16**	**302**	**196**	**354**	**4.9**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**315**	**205**	**194**	**4.82**
26	-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**353**	**229**	**226**	**4.78**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**260**	**169**	**140**	**5.0**
-	**5.43**	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**293**	**190**	**206**	**4.85**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**303**	**197**	-	**5.02**
-	**5.06**	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**316**	**205**	-	**5.12**
		2	<1	<1	**2**	**16**	**328**	**213**		**5.02**
1.43	**5.21**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**329**	**234**	-	**4.89**
5.18	-	**2.0**	< 1.0	< 1.0	**2.0**	**25**	**410**	**266**	**232**	**5.02**
7.32	-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**294**	**191**	**208**	**4.92**
-	**4.44**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**327**	**212**	**320**	**4.87**
-	-	**7.0**	< 1.0	< 1.0	**7.0**	**25**	**334**	**217**	**220**	**5.39**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**353**	**229**	**188**	**4.85**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**359**	**233**	**195**	**4.83**
-	**4.7**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**373**	**242**	**224**	**4.66**
3.15	-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**404**	**263**	-	**4.86**
3.48	**5.38**	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**419**	**272**	-	**4.76**
3.62		**2**	<1	<1	**2**	**33**	**439**	**285**		**5.01**
5.6	-	< 1.0	< 1.0	< 1.0	< 1.0	**299**	**893**	**580**	**707**	**4.01**
5.13	**2.45**	< 1.0	< 1.0	< 1.0	< 1.0	**233**	**947**	**616**	**715**	**4.6**
2.28	-	< 1.0	< 1.0	< 1.0	< 1.0	**190**	**847**	**550**	**512**	**4.5**
4.64	-	< 1.0	< 1.0	< 1.0	< 1.0	**194**	**876**	**569**	**568**	**4.42**
2.12	-	< 1.0	< 1.0	< 1.0	< 1.0	**177**	**813**	**528**	**548**	**4.53**
5.38	**3.49**	< 1.0	< 1.0	< 1.0	< 1.0	**213**	**1,080**	**702**	**689**	**4.32**
4.68	-	< 1.0	< 1.0	< 1.0	< 1.0	**168**	**1,050**	**682**	-	**5.32**
3.03	**4.91**	< 1.0	< 1.0	< 1.0	< 1.0	**158**	**1,090**	**708**	-	**5.06**
-	**3.38**	**11**	< 1.0	< 1.0	**11**	**26**	**262**	**228**	-	**6.21**
-	-	**4.0**	< 1.0	< 1.0	**4.0**	**40**	**344**	**224**	**279**	**5.42**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**45**	**220**	**143**	**190**	**5.2**
-	**2.47**	**1.0**	< 1.0	< 1.0	**1.0**	**38**	**271**	**176**	**300**	**5.24**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**300**	**195**	**170**	**4.58**
5.38	-	< 1.0	< 1.0	< 1.0	< 1.0	**69**	**451**	**293**	**246**	**4.47**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**44**	**338**	**220**	**192**	**4.47**
-	**2.57**	< 1.0	< 1.0	< 1.0	< 1.0	**50**	**374**	**243**	**201**	**4.3**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**383**	**249**	-	**4.75**
-	**2.72**	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**278**	**181**	-	**5.39**
		6	<1	<1	**6**	**39**	**301**	**196**		**5.75**
13	-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**293**	**190**	**198**	**4.0**
-	**3.1**	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**331**	**215**	**288**	**4.08**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**316**	**205**	**163**	**4.31**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**46**	**367**	**238**	**207**	**4.46**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**308**	**200**	**160**	**4.48**
-	**3.01**	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**360**	**234**	**208**	**4.35**
-	-	< 1.0	< 1.0	< 1.0	< 1.0	**40**	**365**	**237**	-	**4.48**
-	**3.22**	< 1.0	< 1.0	< 1.0	< 1.0	**30**	**348**	**226**	-	**4.48**

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons			
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-
RINSATE10_171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons -		
C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	-	-	-	< 20	< 20					-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20					< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC					NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 50	-	-	-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
800	< 50	< 100	< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
< 100	< 50	< 100	< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100
-	< 50	< 100	< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Silcia Clean up	
>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
µg/L	µg/L
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
-	-
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	< 100
-	-
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
< 100	< 100
NC	NC
< 100	< 100
< 100	-
NC	NC
< 100	< 100
< 100	< 100

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals															
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																	
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	-	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	0.002	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001		< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001		0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001		0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%		**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	-	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09_181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09_181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09_18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.005	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	NC	**181%**	NC	NC	9%	NC	**111%**	NC	NC	**172%**
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE10_171219	17-Dec-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	-	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids							
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type								
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC
TRIP BLANK 09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE 09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Perfluoroalkyl Carboxylic Acids										
Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05
< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Perfluoroalkyl Sulfonamides					(n:2) Fluorotelomer Sulfonic Acids				
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	0%
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	0.03
NC	NC	NC	NC	NC	NC	NC	NC	NC	**100%**
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Sum of PFAS	
Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
0.01	0.01
0.01	0.01
0%	0%
0.01	0.01
< 0.05	< 0.1
86%	**133%**
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
< 0.01	< 0.01
NC	NC
< 0.01	< 0.01
< 0.05	< 0.1
NC	NC
< 0.01	< 0.01
< 0.01	< 0.01

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1941879**	Page	: 1 of 19
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 Mitchell Rd Cardiff 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019 12:26
Order number	: 20193820	Date Analysis Commenced	: 18-Dec-2019
C-O-C number	: 6900	Issue Date	: 02-Jan-2020 15:46
Sampler	: DANIEL KOUSBROEK		
Site	: Williiamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP231X: Positive result for analyte 6:2 Fluorotelomer sulfonic acid (6:2 FTS) on sample ES1941879_006 has been confirmed by re-extraction and re-analysis.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.05	5.43	5.44	5.58	5.14
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		118	106	85	207	210
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		77	69	55	134	136
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		8	13	7	21	20
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		15	2	3	5	2
Total Alkalinity as CaCO3	----	1	mg/L		15	2	3	5	2
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		5	8	6	16	15
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		23	17	16	42	44
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	1	2	<1
Magnesium	7439-95-4	1	mg/L		2	2	1	4	5
Sodium	7440-23-5	1	mg/L		14	13	9	26	26
Potassium	7440-09-7	1	mg/L		<1	<1	1	1	1
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		8.48	0.10	<0.05	1.78	0.98
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	0.06	0.05	0.06
Barium	7440-39-3	0.001	mg/L		0.002	0.004	0.012	0.026	0.009
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	0.001
Chromium	7440-47-3	0.001	mg/L		0.003	0.002	0.001	0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.001	0.006	0.008	0.003	<0.001
Manganese	7439-96-5	0.001	mg/L		0.009	0.012	0.014	0.007	0.011
Nickel	7440-02-0	0.001	mg/L		<0.001	0.001	<0.001	0.001	0.003

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.028**	**0.006**	**0.005**	**0.006**	**0.007**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.05**	**0.69**	**0.64**	**1.62**	**1.59**
ø Total Cations	----	0.01	meq/L		**0.77**	**0.83**	**0.55**	**1.58**	**1.57**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	**0.19**	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	**0.19**	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	**0.19**	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**125**	**121**	**128**	**125**	**117**
Toluene-D8	2037-26-5	2	%		**109**	**111**	**115**	**119**	**112**
4-Bromofluorobenzene	460-00-4	2	%		**103**	**104**	**106**	**110**	**105**
EP231S: PFAS Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	17-Dec-2019 12:28	17-Dec-2019 12:09	17-Dec-2019 11:47	17-Dec-2019 13:39	17-Dec-2019 13:57
Compound	CAS Number	LOR	Unit		ES1941879-001	ES1941879-002	ES1941879-004	ES1941879-006	ES1941879-007
					Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		----	----	96.2	106	104
13C8-PFOA	----	0.02	%		----	----	99.9	116	103

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH-8	MW239S	BH-11	----	----
			Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit	ES1941879-008	ES1941879-010	ES1941879-011	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.02**	**5.01**	**5.03**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**328**	**439**	**196**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**213**	**285**	**127**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**16**	**33**	**16**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**2**	**2**	**2**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**2**	**2**	**2**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**10**	**6**	<1	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**75**	**127**	**48**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L	**4**	**8**	**4**	----	----
Sodium	7440-23-5	1	mg/L	**50**	**65**	**26**	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	**3.02**	**1.33**	**1.00**	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Boron	7440-42-8	0.05	mg/L	**0.05**	<0.05	**0.06**	----	----
Barium	7440-39-3	0.001	mg/L	**0.007**	**0.008**	**0.004**	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.003**	**0.002**	----	----
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.001**	**0.002**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.011**	**0.003**	**0.008**	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.002**	**0.001**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
				Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	--------	--------
					Result	Result	Result	----	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	----	----
Zinc	7440-66-6	0.005	mg/L		**0.007**	<0.005	**0.006**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L		**2.36**	**3.75**	**1.39**	----	----
ø **Total Cations**	----	0.01	meq/L		**2.50**	**3.48**	**1.46**	----	----
ø **Ionic Balance**	----	0.01	%		**----**	**3.62**	**----**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
				Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	--------	--------
					Result	Result	Result	----	----
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
				Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	--------	--------
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**116**	**117**	**116**	----	----
Toluene-D8	2037-26-5	2	%		**111**	**110**	**106**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**108**	**105**	**100**	----	----
EP231S: PFAS Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	MW239S	BH-11	----	----
				Client sampling date / time	17-Dec-2019 14:15	17-Dec-2019 13:18	17-Dec-2019 12:56	----	----
Compound	CAS Number	LOR	Unit		ES1941879-008	ES1941879-010	ES1941879-011	--------	--------
					Result	Result	Result	----	----
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		**94.0**	----	----	----	----
13C8-PFOA	----	0.02	%		**99.2**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Client sample ID	SW3	----	----	----	----
			Client sampling date / time	17-Dec-2019 10:17	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-005	--------	--------	--------	--------
				Result	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.75**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**301**	----	----	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**196**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**39**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**6**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**6**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**25**	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**57**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**4**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**7**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**40**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	----	----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	**1.42**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	----	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.041**	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	**0.003**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L	**0.026**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.001**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Client sample ID	SW3	----	----	----	----
				Client sampling date / time	17-Dec-2019 10:17	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-005	--------	--------	--------	--------	
				Result	----	----	----	----	
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	
Selenium	7782-49-2	0.01	mg/L	<0.01	----	----	----	----	
Vanadium	7440-62-2	0.01	mg/L	<0.01	----	----	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.005	----	----	----	----	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L	<0.1	----	----	----	----	
EN055: Ionic Balance									
ø **Total Anions**	----	0.01	meq/L	**2.25**	----	----	----	----	
ø **Total Cations**	----	0.01	meq/L	**2.54**	----	----	----	----	

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
			Client sampling date / time	17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	--------	--------	--------
				Result	Result	----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
			Client sampling date / time	17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit	ES1941879-012	ES1941879-013	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
				Client sampling date / time	17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit		ES1941879-012	ES1941879-013	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QW10 Rinsate glove	Trip Blank 10	----	----	----
				Client sampling date / time	17-Dec-2019 14:22	17-Dec-2019 14:23	----	----	----
Compound	CAS Number	LOR	Unit		ES1941879-012	ES1941879-013	--------	--------	--------
					Result	Result	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**110**	**113**	----	----	----
Toluene-D8	2037-26-5	2	%		**95.2**	**103**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**94.8**	**98.1**	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**110**	**80.1**	----	----	----
13C8-PFOA	----	0.02	%		**105**	**85.6**	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1941879**	Page	: 1 of 11
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 Mitchell Rd Cardiff 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019
Order number	: 20193820	Date Analysis Commenced	: 18-Dec-2019
C-O-C number	: 6900	Issue Date	: 02-Jan-2020
Sampler	: DANIEL KOUSBROEK		
Site	: Williiamtown SS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)F: Dissolved Metals by ICP-AES (QC Lot: 2777503)									
ES1941879-013	Trip Blank 10	EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES1941879-006	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	1.78	1.82	2.04	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2773602)									
ES1941631-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.66	7.67	0.130	0% - 20%
ES1941879-007	BH-7	EA005-P: pH Value	----	0.01	pH Unit	5.14	4.99	2.96	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2773603)									
ES1941631-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	379	379	0.00	0% - 20%
ES1941879-007	BH-7	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	210	213	1.02	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2773604)									
ES1941631-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	178	176	0.814	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	178	176	0.814	0% - 20%
ES1941879-007	BH-7	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	2	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2	2	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780396)									
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2450	2410	1.34	0% - 20%
ES1941806-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2780398)									
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13500	14000	3.58	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2780397)									
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3740	3760	0.306	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED045G: Chloride by Discrete Analyser (QC Lot: 2780397) - continued									
ES1941806-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	14	14	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 2777502)									
ES1941796-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	134	135	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	195	197	0.923	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	430	436	1.28	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
ES1941879-006	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	26	27	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2777500)									
ES1941796-002	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.023	0.023	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	0.006	0.005	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.906	0.927	2.25	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.015	0.015	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	<0.005	89.6	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.17	0.16	0.00	No Limit
ES1941879-006	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.026	0.026	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	0.05	0.06	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG035F: Dissolved Mercury by FIMS (QC Lot: 2777499) - continued									
ES1941796-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1941879-006	BH-6	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2773601)									
ES1941631-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.1	<0.1	0.00	No Limit
ES1941879-007	BH-7	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1941879-011	BH-11	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1941879-011	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2776755)									
ES1941879-001	BH-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1941879-011	BH-11	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.10	0.09	11.8	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.16	0.14	16.1	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.07	0.06	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2786563) - continued									
EP1913504-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP1913504-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2786563)									
EM1921659-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.49	0.44	10.8	0% - 20%
EP1913504-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.03	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)F: Dissolved Metals by ICP-AES (QCLot: 2777503)								
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	82.0	114
EA005P: pH by PC Titrator (QCLot: 2773602)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.0	102
				----	7 pH Unit	99.7	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2773603)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	108	95.0	113
ED037P: Alkalinity by PC Titrator (QCLot: 2773604)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	83.4	81.0	111
				----	50 mg/L	96.2	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.5	82.0	122
				<1	500 mg/L	96.2	82.0	122
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.5	82.0	122
				<1	500 mg/L	97.2	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2780397)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	80.9	127
				<1	1000 mg/L	96.9	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2777502)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.2	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.6	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.6	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.7	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.5	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.7	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.4	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.3	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.4	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	94.0	82.0	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500) - continued								
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.5	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	87.7	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	95.1	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	87.5	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	103	85.0	115
EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2773601)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	105	82.0	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2772290)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	58.3	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	89.0	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	71.9	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2772290)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	64.1	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	75.8	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	81.8	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.8	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.6	75.0	127
EP080: BTEXN (QCLot: 2776755)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.6	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	93.0	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.1	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	92.9	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	95.9	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.6	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	94.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	93.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563) - continued								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	88.7	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	91.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	81.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	93.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	84.8	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	79.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	75.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	96.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	90.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.0	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.8	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.9	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	99.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	88.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	83.4	67.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	98.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	110	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780396)							
ES1940975-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2780398)							
ES1942356-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2780397)							
ES1940975-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2777500)							
ES1941796-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	109	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	95.2	70.0	130
		EG020A-F: Barium	7440-39-3	1 mg/L	100	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	104	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	90.3	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	94.0	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.3	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	83.2	70.0	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	83.2	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	100	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	93.3	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	102	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2777499)							
ES1941796-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.1	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2773601)							
ES1941481-029	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	98.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	92.7	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	96.2	70.0	130
EP080: BTEXN (QCLot: 2776755)							
ES1941879-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	81.7	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	94.8	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	102	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	105	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	79.2	50.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2786563) - continued							
EM1921659-002	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	85.6	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	99.2	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	98.0	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	106	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	114	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	86.6	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	103	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	91.2	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	83.4	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	86.5	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	94.3	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.6	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	85.9	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	105	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	105	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.4	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2786563)							
EM1921659-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	95.2	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.6	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	89.2	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	109	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1941879**	Page	: 1 of 10
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 17-Dec-2019
Site	: Williiamtown SS	Issue Date	: 02-Jan-2020
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 11
Order number	: 20193820	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1940975--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES1942356--001	Anonymous	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	ES1940975--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural							
BH-1,	BH-2,	----	----	----	18-Dec-2019	17-Dec-2019	**1**
BH-4,	SW3,						
BH-6,	BH-7,						
BH-8,	MW239S,						
BH-11							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Dissolved Metals by ICP-AES	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**18-Dec-2019**	17-Dec-2019	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**18-Dec-2019**	14-Jan-2020	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**20-Dec-2019**	14-Jan-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**18-Dec-2019**	31-Dec-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**21-Dec-2019**	14-Jan-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**21-Dec-2019**	14-Jan-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**20-Dec-2019**	14-Jan-2020	✓
EG005(ED093)F: Dissolved Metals by ICP-AES							
Clear Plastic Bottle - Nitric Acid; Filtered (EG005F)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**----**	----	----	**20-Dec-2019**	14-Jun-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**----**	----	----	**20-Dec-2019**	14-Jun-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**----**	----	----	**21-Dec-2019**	14-Jan-2020	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH-1, BH-2, BH-4, SW3, BH-6, BH-7, BH-8, MW239S, BH-11	**17-Dec-2019**	**----**	----	----	**18-Dec-2019**	14-Jan-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**19-Dec-2019**	24-Dec-2019	✓	**23-Dec-2019**	28-Jan-2020	✓
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**19-Dec-2019**	24-Dec-2019	✓	**23-Dec-2019**	28-Jan-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**21-Dec-2019**	31-Dec-2019	✓	**21-Dec-2019**	31-Dec-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**21-Dec-2019**	31-Dec-2019	✓	**21-Dec-2019**	31-Dec-2019	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, MW239S, BH-11, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**21-Dec-2019**	31-Dec-2019	✓	**21-Dec-2019**	31-Dec-2019	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**30-Dec-2019**	14-Jun-2020	✓	**30-Dec-2019**	14-Jun-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**30-Dec-2019**	14-Jun-2020	✓	**30-Dec-2019**	14-Jun-2020	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**30-Dec-2019**	14-Jun-2020	✓	**30-Dec-2019**	14-Jun-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**30-Dec-2019**	14-Jun-2020	✓	**30-Dec-2019**	14-Jun-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, QW10 - Rinsate glove, Trip Blank 10	**17-Dec-2019**	**30-Dec-2019**	14-Jun-2020	✓	**30-Dec-2019**	14-Jun-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	10	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-AES	EG005F	WATER	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. The ICPAES technique ionises the 0.45µm filtered samples, emitting a characteristic spectrum which is compared against matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

CHAIN OF CUSTODY

(ALS) COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X			
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		

Environmental Division Sydney

Work Order Reference

ES1941879

Telephone : +61-2-8784 8555

CHAIN OF CUSTODY

(ALS) COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	MW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X		X	X		

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076930	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056683	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

(Free ice) / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00350719008431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MW239S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MW239S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MW239S	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056585	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056632	Red	Yes	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056577	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193620

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

013	Trip Blank 10	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022908	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0

CHAIN OF CUSTODY

(ALS) COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X			
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		

Environmental Division Sydney

Work Order Reference

ES1941879

Telephone : +61-2-8784 8555

CHAIN OF CUSTODY

ALS COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	MW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X		X	X		

CHAIN OF CUSTODY

ALS COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	Sophie ALS DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219051061	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076830	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056683	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

(Free ice) / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00350719008431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MW239S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MW239S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MW239S	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056585	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056632	Red	Yes	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056577	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

013	Trip Blank 10	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022908	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0

ALSCompass
SAMPLING *Intelligence*

ALS Use Only

Custody Document for Submissions via ALS Compass App

Project: WSS **Client:** Klienfelder **Project Manager:** Tom Overton

Phone: ( )

ALS Compass COC Reference: 6900 **# Samples:** 13 **Sampler:** Daniel Hausbrook

Phone: (0458197676)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	2.6 °C		

Custody:

Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
Daniel Hausbrook	AC		HJ 17.12.19 7:25pm
Date / Time: 17/12/19 1535	**Date / Time:** 17.12.19 3:37pm	**Date / Time:**	**Date / Time:**

E-MAILED

LAB OF ORIGIN: NEWCASTLE

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1925	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	BH-1		17/12/2019 12:28 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		17/12/2019 12:09 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	SW1	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		
004	BH-4		17/12/2019 11:47 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	SW3		17/12/2019 10:17 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X			
006	BH-6		17/12/2019 01:39 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-7		17/12/2019 01:57 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
008	BH-8		17/12/2019 02:15 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
009	SW4	Dry		Water	ALS: 0 Non ALS: 0	No	X		X	X	X		

Environmental Division Sydney

Work Order Reference

ES1941879

Telephone : +61-2-8784 8555

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019/ALLENVENG0 010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	MW239S		17/12/2019 01:18 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
011	BH-11		17/12/2019 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW10	Rinsate glove	17/12/2019 02:22 PM	Water	ALS: 4 Non ALS: 0	No	X	X	X	X	X		
013	Trip Blank 10		17/12/2019 02:23 PM	Water	ALS: 4 Non ALS: 0	No	X	X		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 6900 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	Sophie ALS DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519076917	Green	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043102	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719051306	Orange	No	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058628	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219051081	Red	Yes	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076918	Green	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056672	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719051296	Orange	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058832	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00160719058513	Purple	No	
004	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076944	Green	No	
004	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719028807	Orange	No	
004	BH-4	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056648	Red	Yes	
004	BH-4	HDPE (no PTFE)	60 mL	00350719008145	Grey	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043095	Purple	No	
004	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043098	Purple	No	
005	SW3	Clear Plastic Bottle - Natural	500 mL	00070519076930	Green	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028931	Purple	No	
005	SW3	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028966	Purple	No	
005	SW3	Amber Glass Bottle - Unpreserved	100 mL	00400719051245	Orange	No	
005	SW3	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056649	Red	Yes	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063761	Purple	No	
006	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063728	Purple	No	
006	BH-6	HDPE (no PTFE)	60 mL	00350719008135	Grey	No	
006	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400219022939	Orange	No	
006	BH-6	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056683	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 2.6 C

Other comments:

006	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519076919	Green	No	
007	BH-7	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056660	Red	Yes	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043163	Purple	No	
007	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00160719043158	Purple	No	
007	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519076946	Green	No	
007	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719051289	Orange	No	
007	BH-7	HDPE (no PTFE)	60 mL	00350719008431	Grey	No	
008	BH-8	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056601	Red	Yes	
008	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076940	Green	No	
008	BH-8	HDPE (no PTFE)	60 mL	00350719008291	Grey	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064072	Purple	No	
008	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00160719064808	Purple	No	
008	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719051330	Orange	No	
010	MW239S	Amber Glass Bottle - Unpreserved	100 mL	00400219022866	Orange	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028804	Purple	No	
010	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028948	Purple	No	
010	MW239S	Clear Plastic Bottle - Natural	500 mL	00070519076942	Green	No	
010	MW239S	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056585	Red	Yes	
011	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519076927	Green	No	
011	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400219022892	Orange	No	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063581	Purple	No	
011	BH-11	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056632	Red	Yes	
011	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00160219063683	Purple	No	
012	QW10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719028971	Purple	No	
012	QW10	HDPE (no PTFE)	60 mL	00350719008314	Grey	No	
012	QW10	Amber Glass Bottle - Unpreserved	100 mL	00400219023026	Orange	No	
012	QW10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056577	Red	Yes	

CHAIN OF CUSTODY

ALS COC#: 6900 ALS Laboratory: ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	Sophie ALS DATE TIME: 17/12/19 1930	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: Williamtown SS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No (N/A)

Free ice / frozen ice bricks present upon receipt? (Yes) No N/A

Random Sample Temperature on Receipt: 2.6 °C

Other comments:

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

013	Trip Blank 10	HDPE (no PTFE)	60 mL	00350719008097	Grey	No	
013	Trip Blank 10	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120219056562	Red	Yes	
013	Trip Blank 10	Amber VOC Vial - Sulfuric Acid	40 mL	00160719084797	Purple	No	
013	Trip Blank 10	Amber Glass Bottle - Unpreserved	100 mL	00400219022908	Orange	No	

Total Bottle Count: ALS: 57, Non ALS: 0

ALSCompass
SAMPLING *Intelligence*

ALS Use Only

Custody Document for Submissions via ALS Compass App

Project: WSS **Client:** Klienfelder **Project Manager:** Tom Overton

Phone: ( )

ALS Compass COC Reference: 6900 **# Samples:** 13 **Sampler:** Daniel Hausbrock

Phone: (0458147676)

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:	ALS Use Only			
	Custody seal intact?	YES	NO	(N/A)
	Free ice / frozen ice bricks upon receipt?	(YES)	NO	N/A
	Random sample temperature on receipt?	2.6 °C		

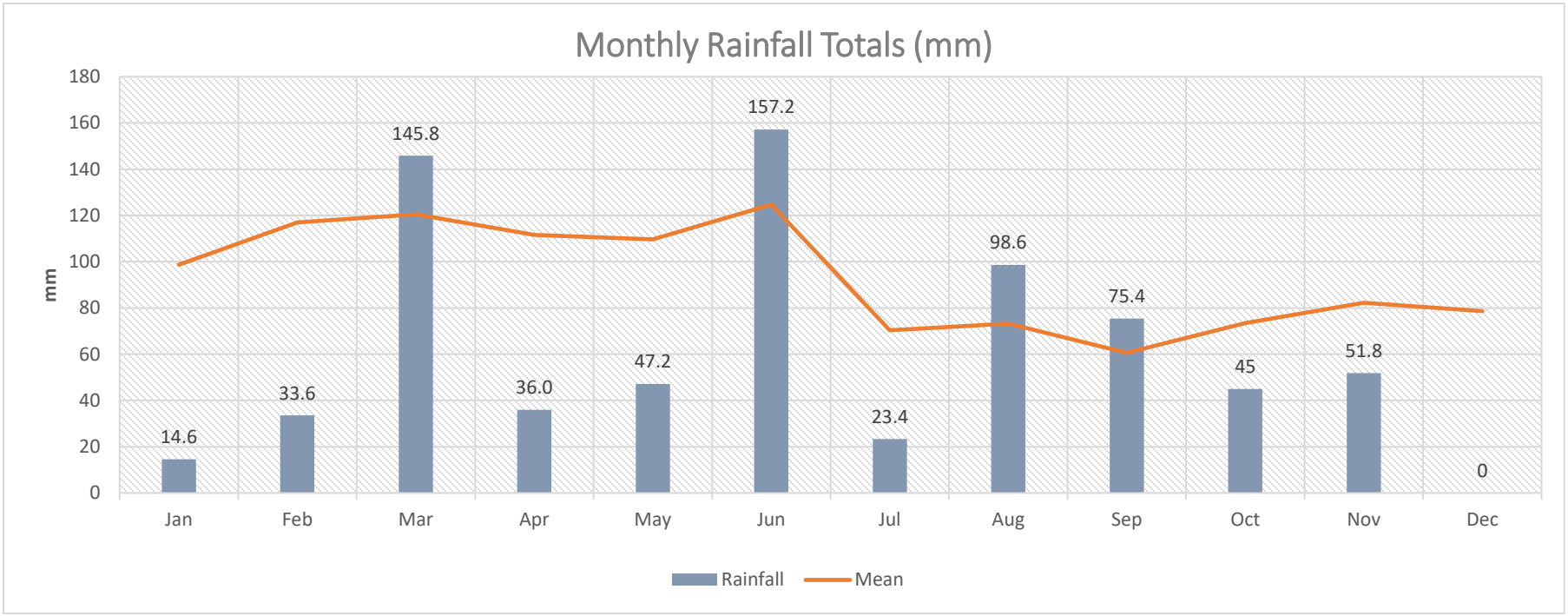
Custody:

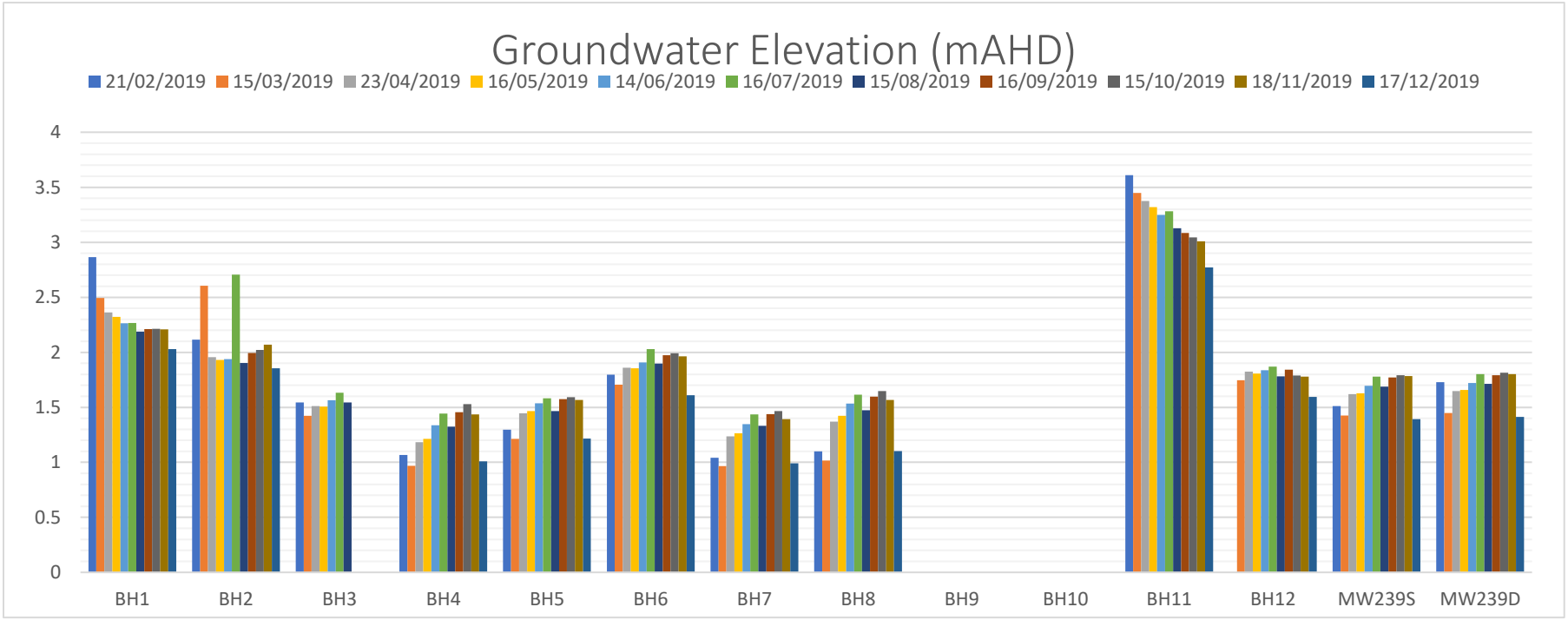
Relinquished by:	**Received by:**	**Relinquished by:**	**Received by:**
Daniel Hausbrock	AL		HJ 17.12.19 7:25pm
Date / Time: 17/12/19 1535	**Date / Time:** 17.12.19 3:37pm	**Date / Time:**	**Date / Time:**

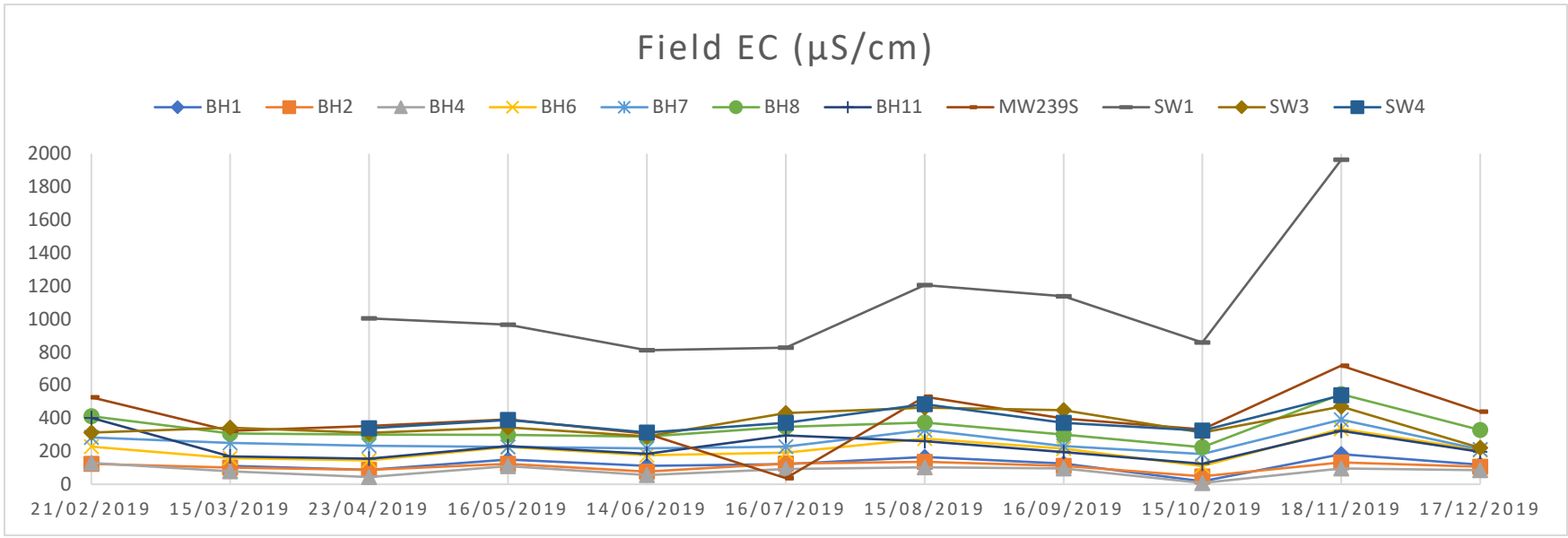
EMAILED

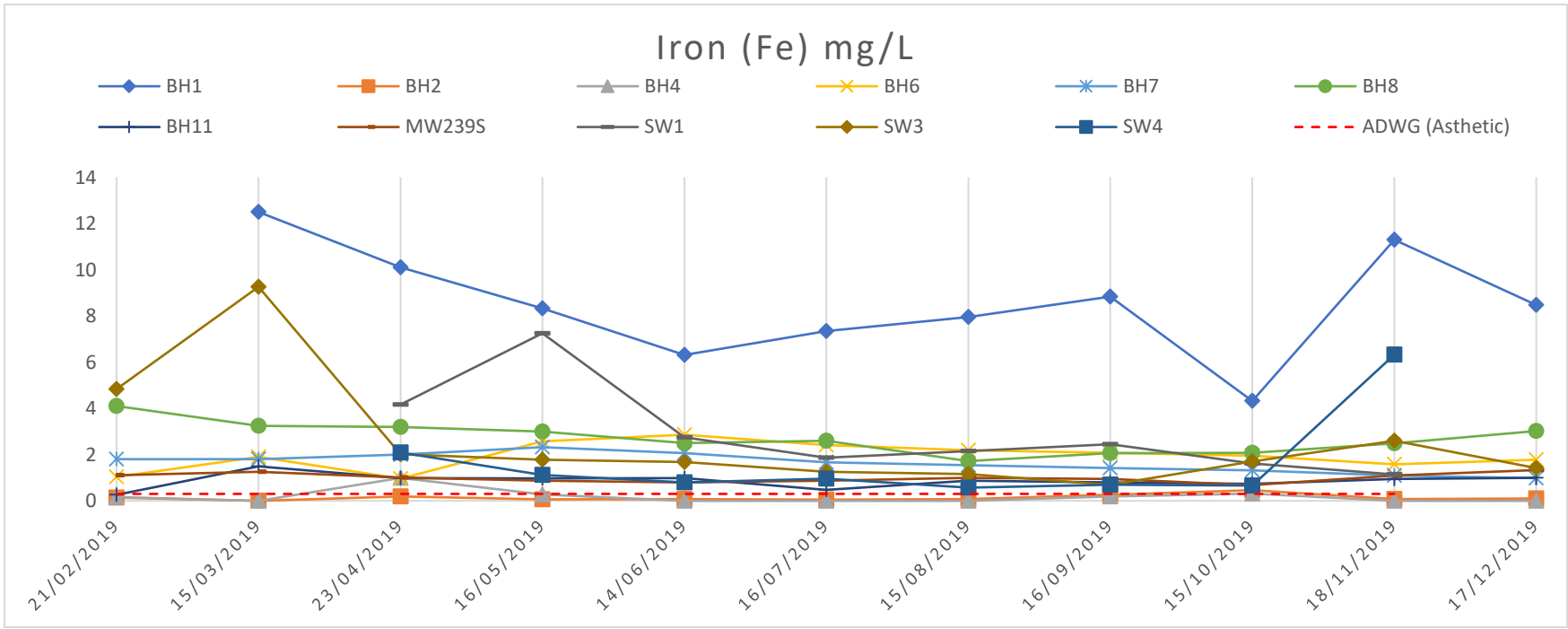
LAB OF ORIGIN: NEWCASTLE

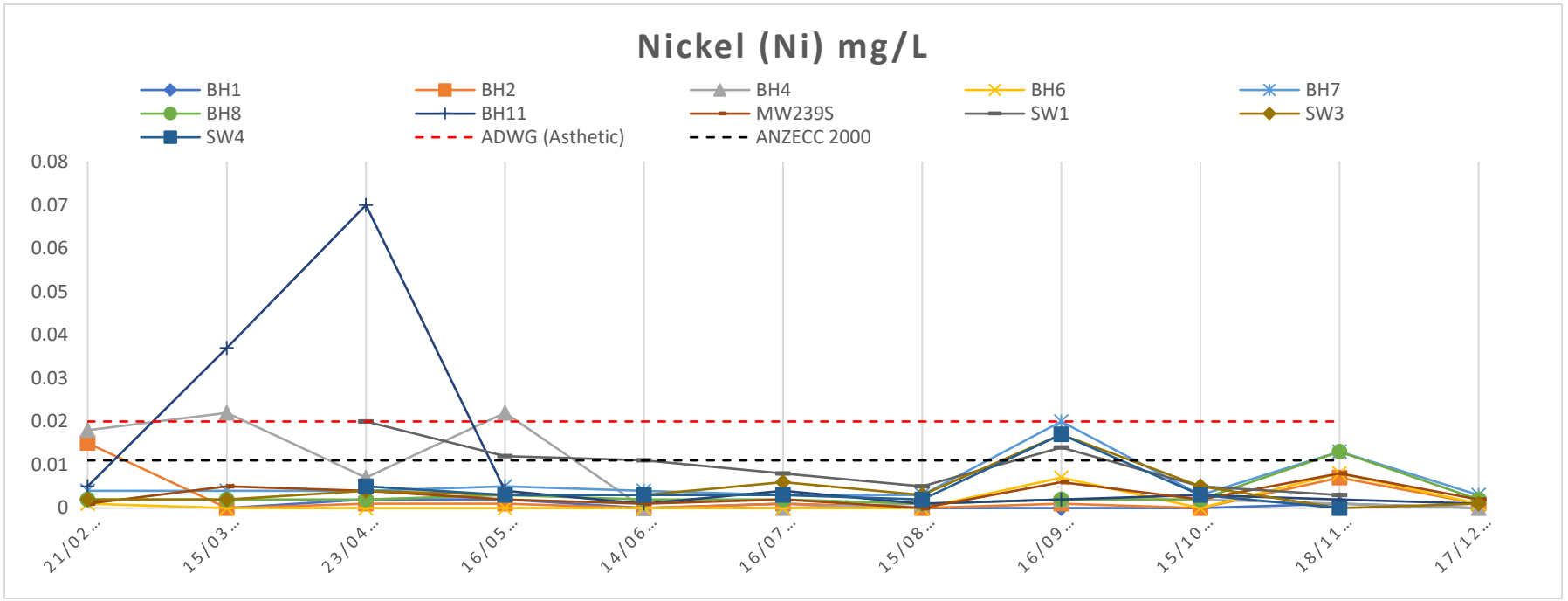
ATTACHMENT B: TREND DATA

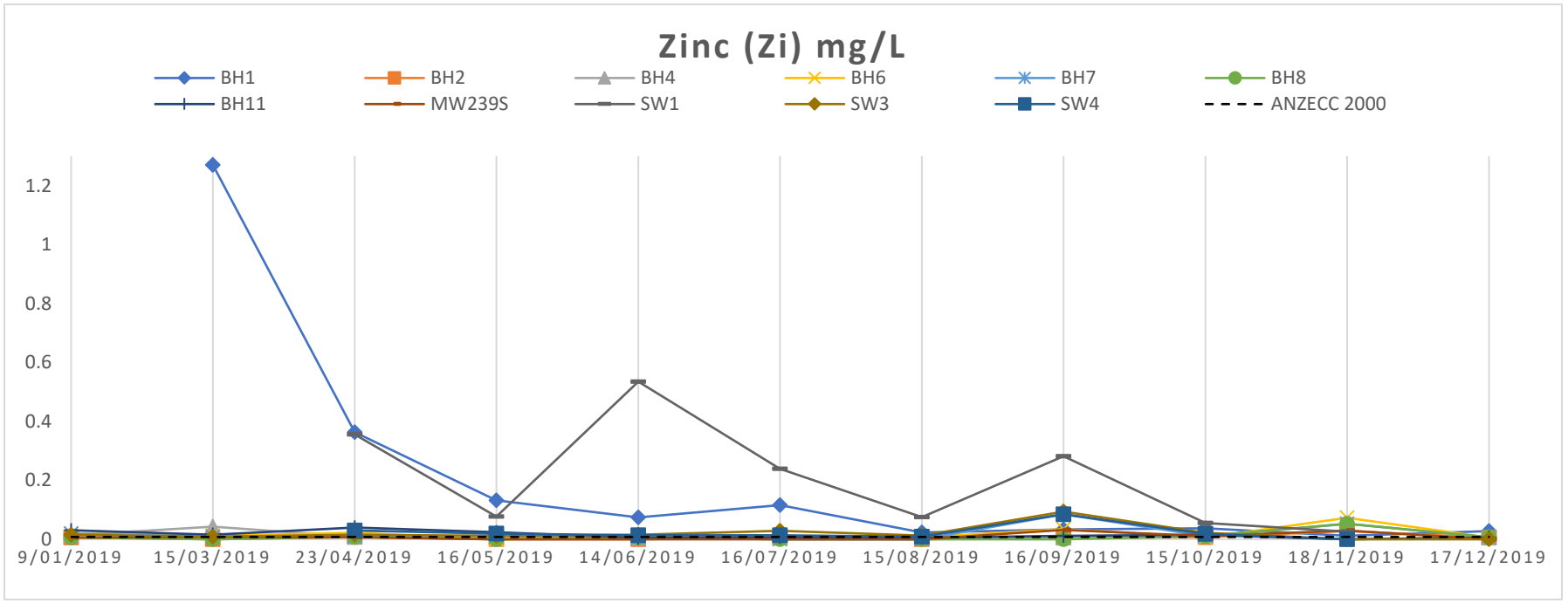

Monthly Rainfall Totals (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
45
51.8
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Rainfall
Mean

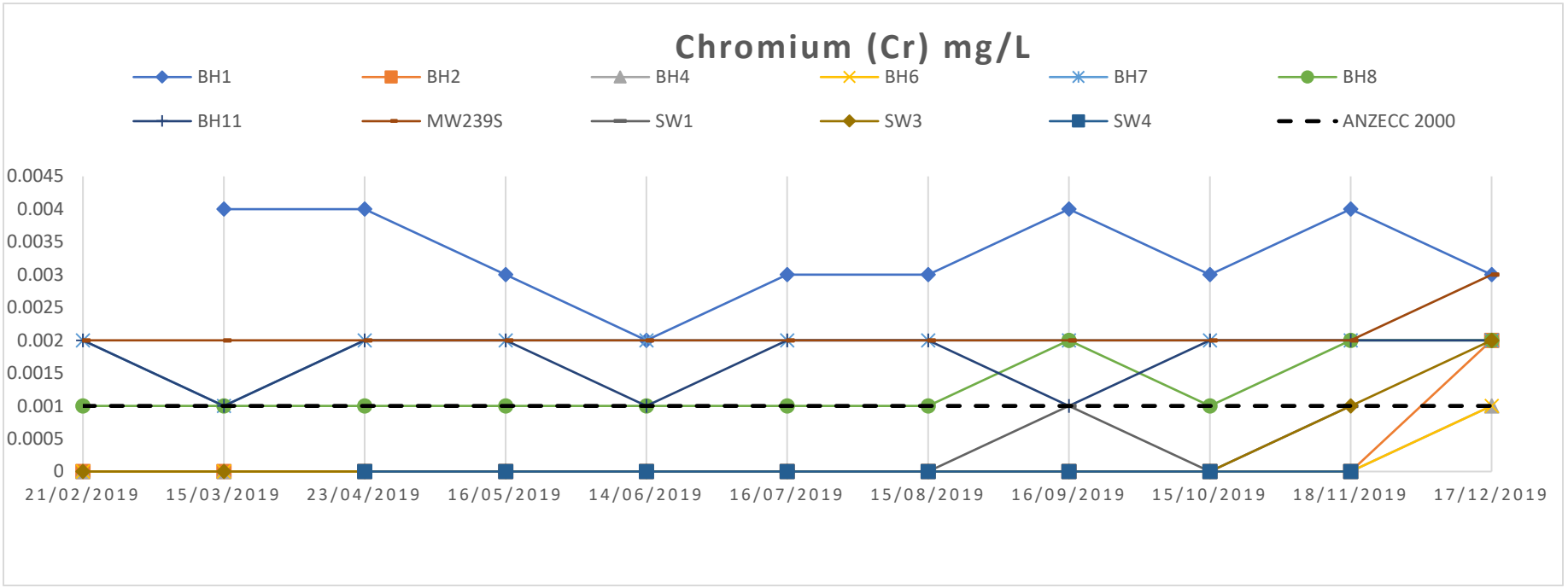

Groundwater Elevation (mAHD)
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
4
3.5
3
2.5
2
1.5
1
0.5
0
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12
MW239S
MW239D

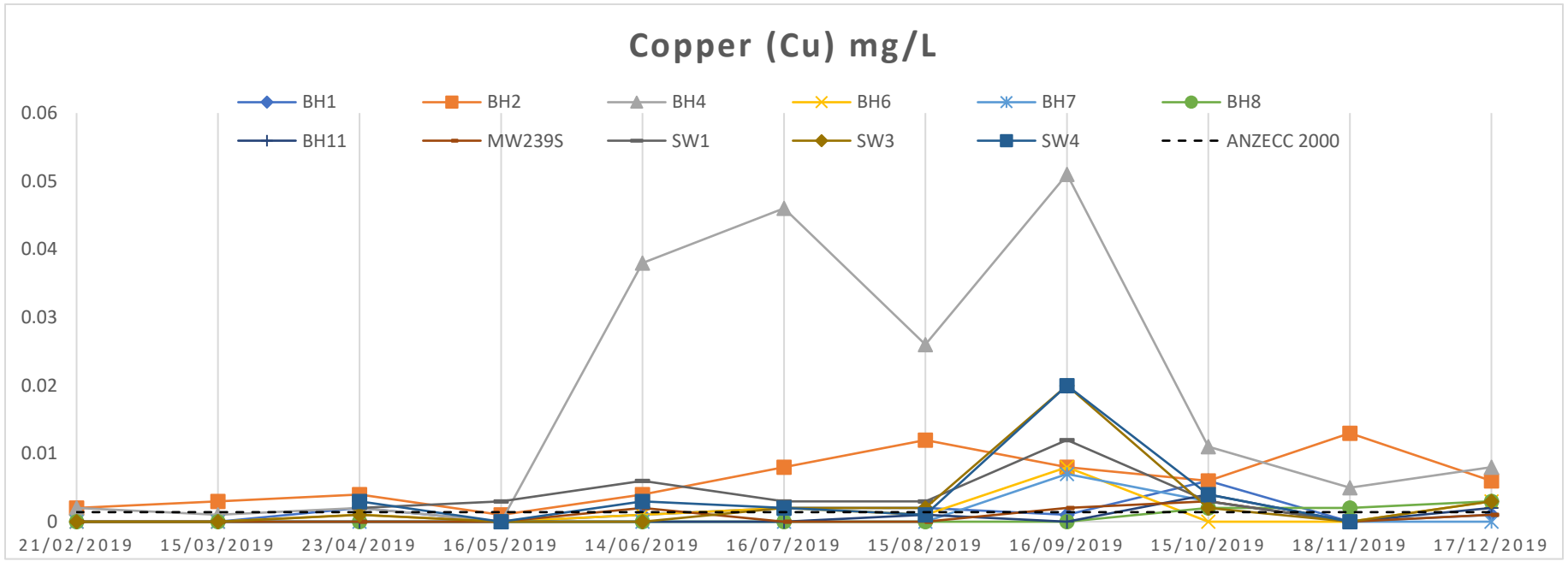

Field EC (µS/cm)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
2000
1800
1600
1400
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019

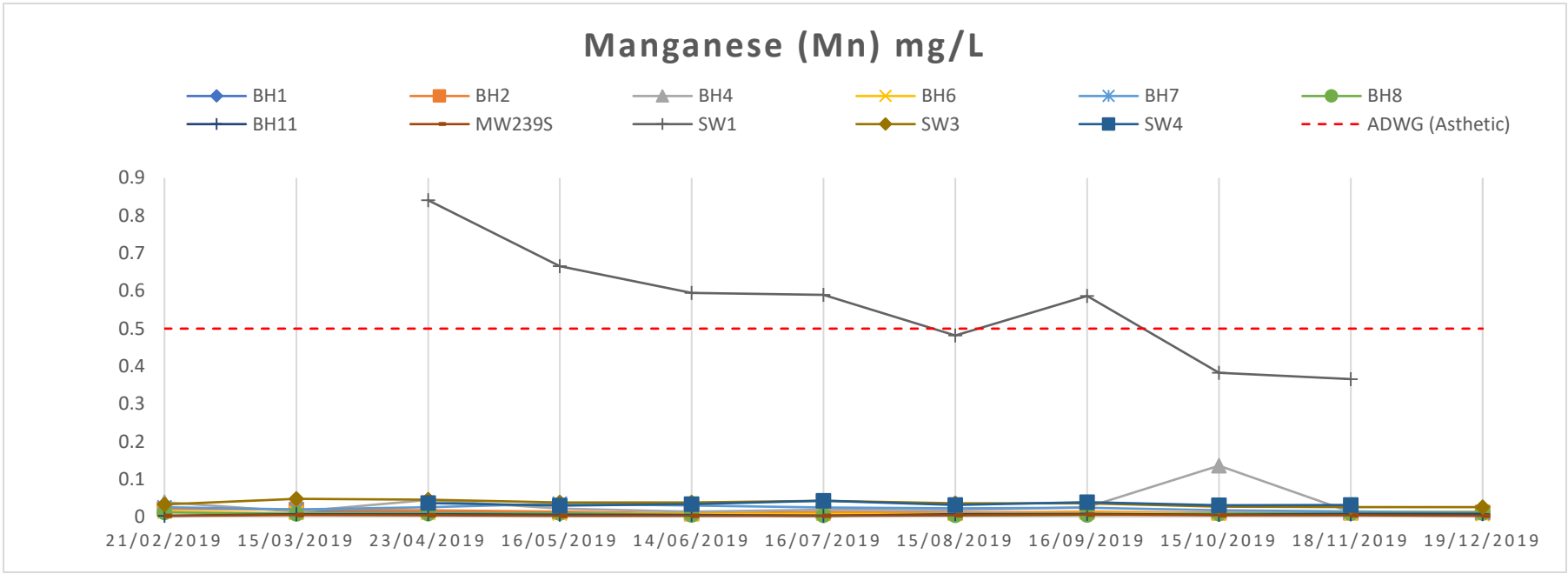

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8
6
4
2
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019

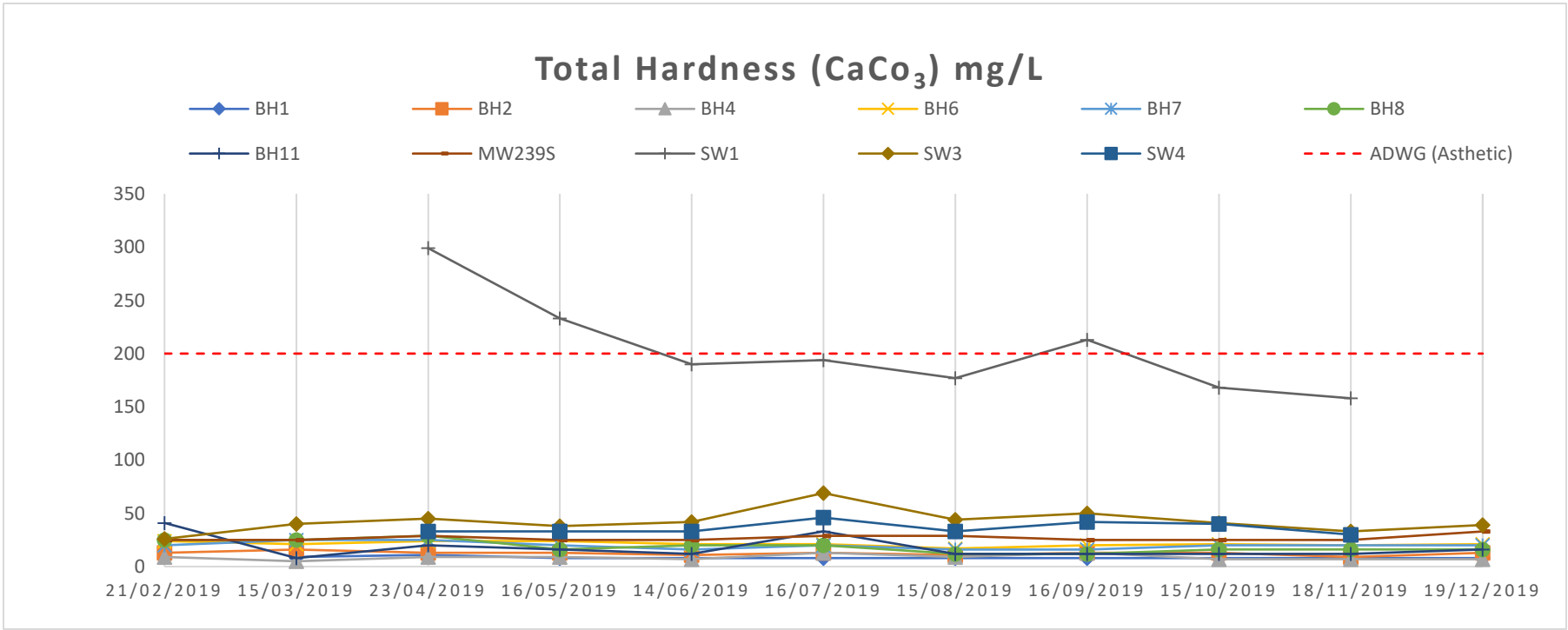

Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
21/02...
15/03...
23/04...
16/05...
14/06...
16/07...
15/08...
16/09...
15/10...
18/11...
17/12...

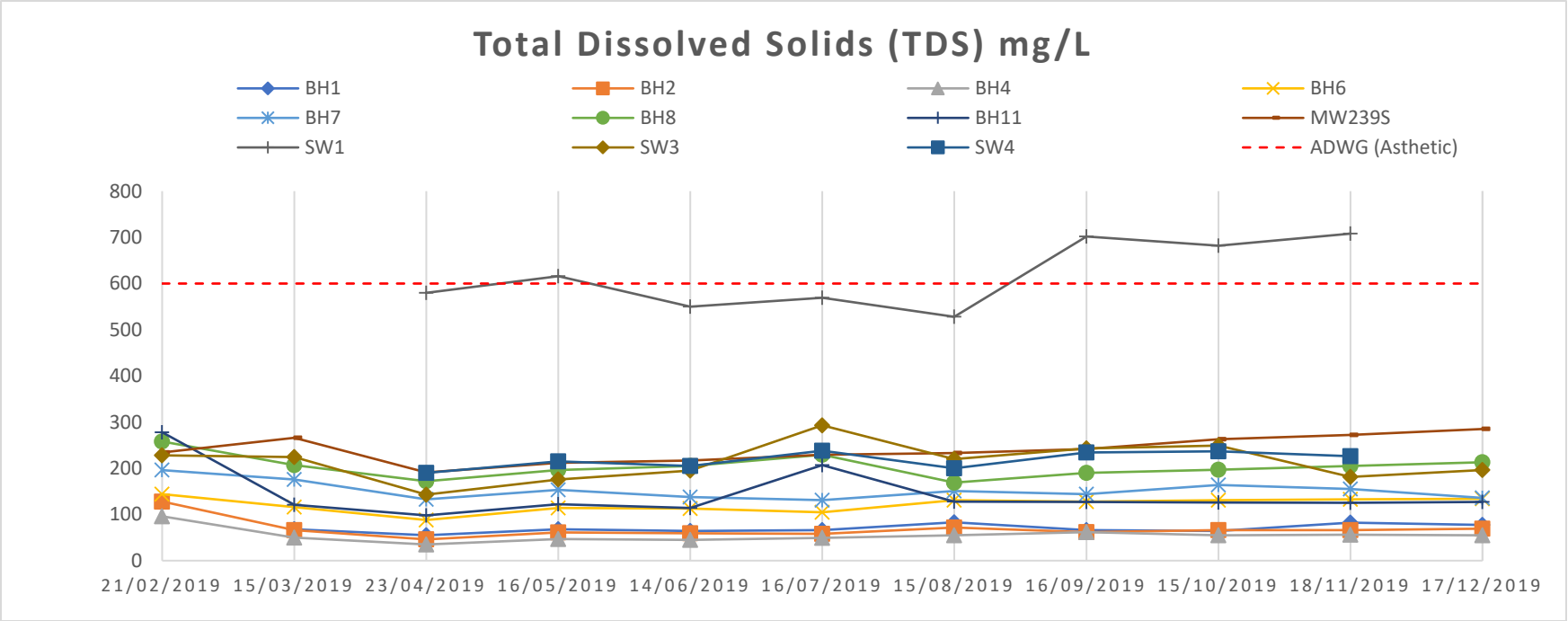

Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1
0.8
0.6
0.4
0.2
0
9/01/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019

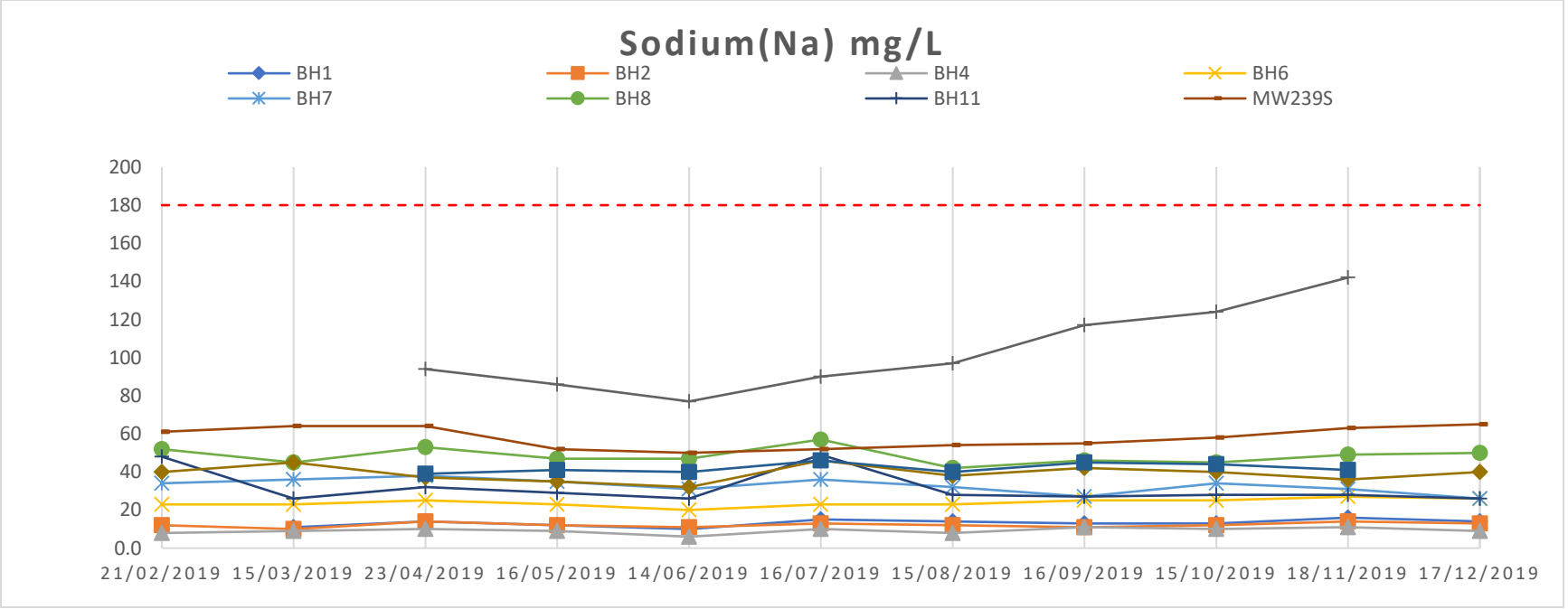

Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019

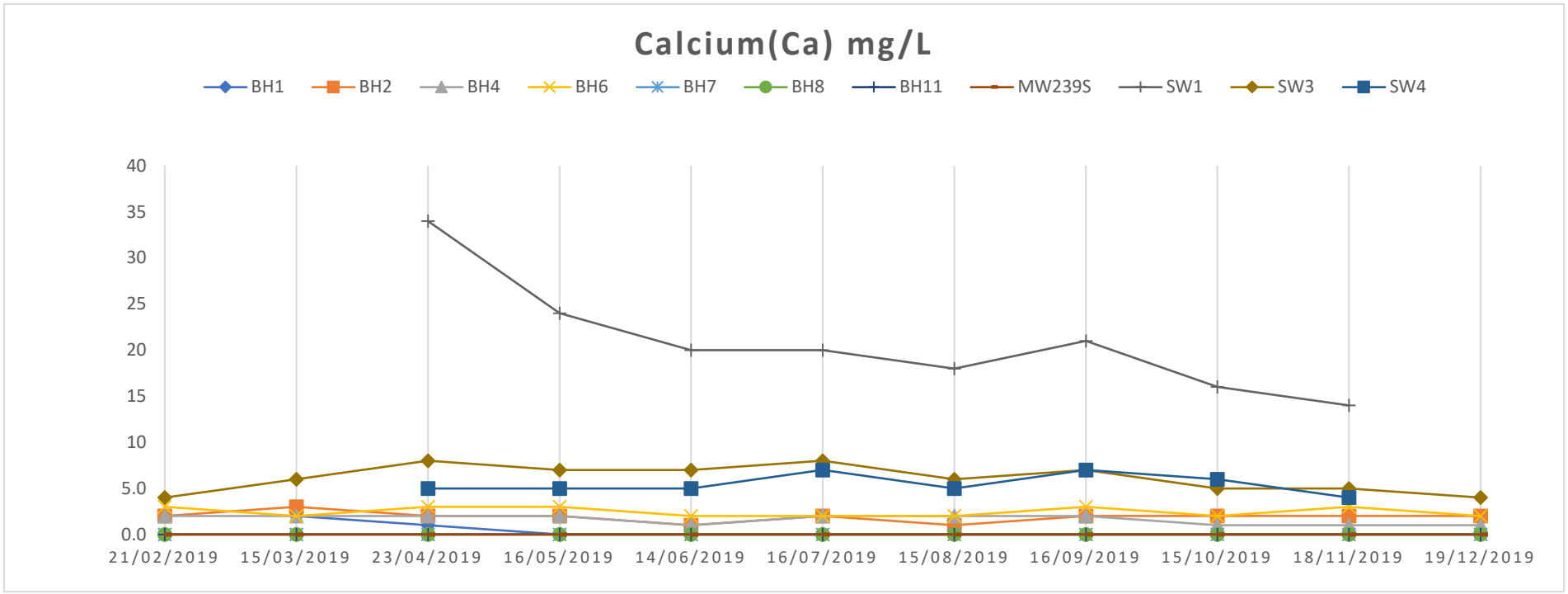

Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019

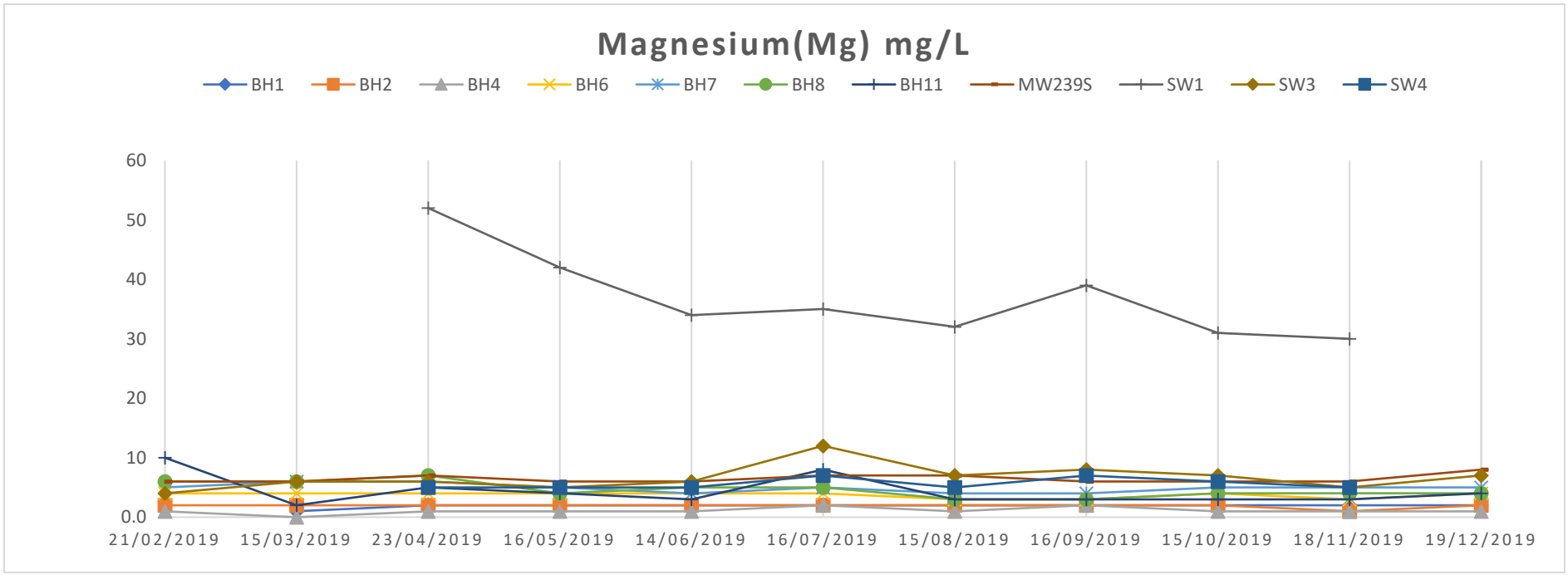

Manganese (Mn) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Total Hardness ($CaCo_3$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Total Dissolved Solids (TDS) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
800
700
600
500
400
300
200
100
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019


Sodium(Na) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
200
180
160
140
120
100
80
60
40
20
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019


Calcium(Ca) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
40
35
30
25
20
15
10
5.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Magnesium(Mg) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
60
50
40
30
20
10
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
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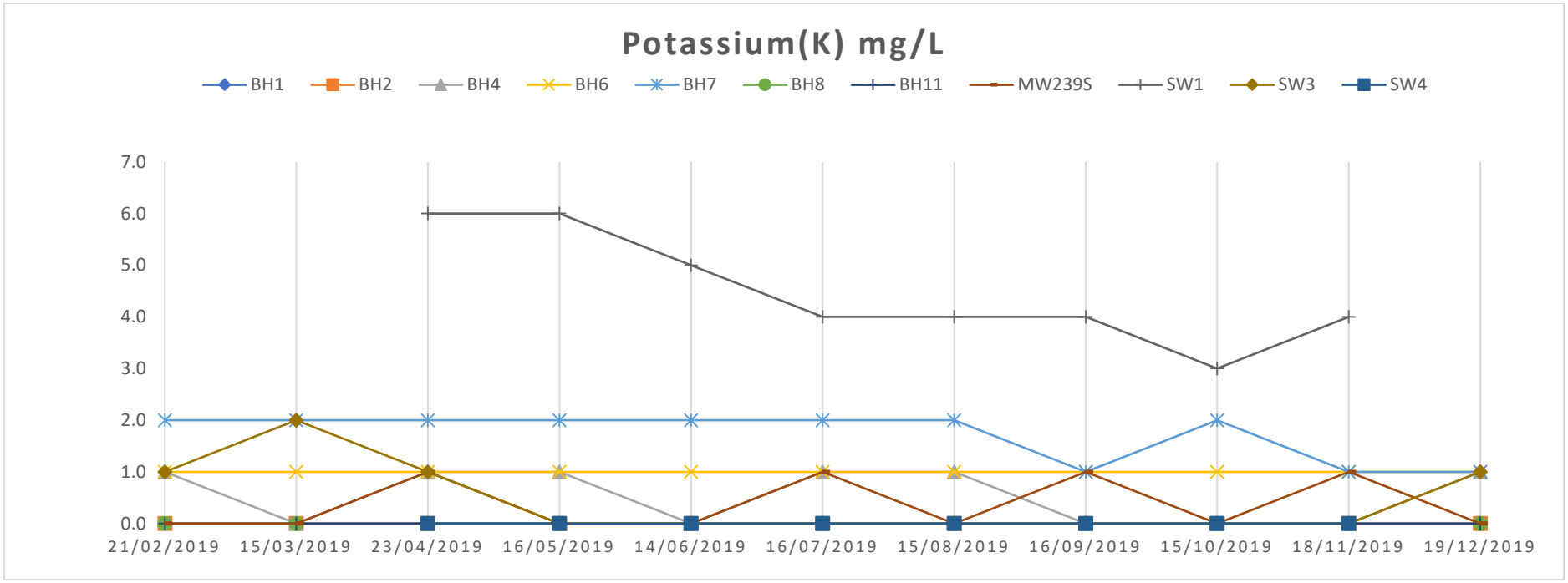
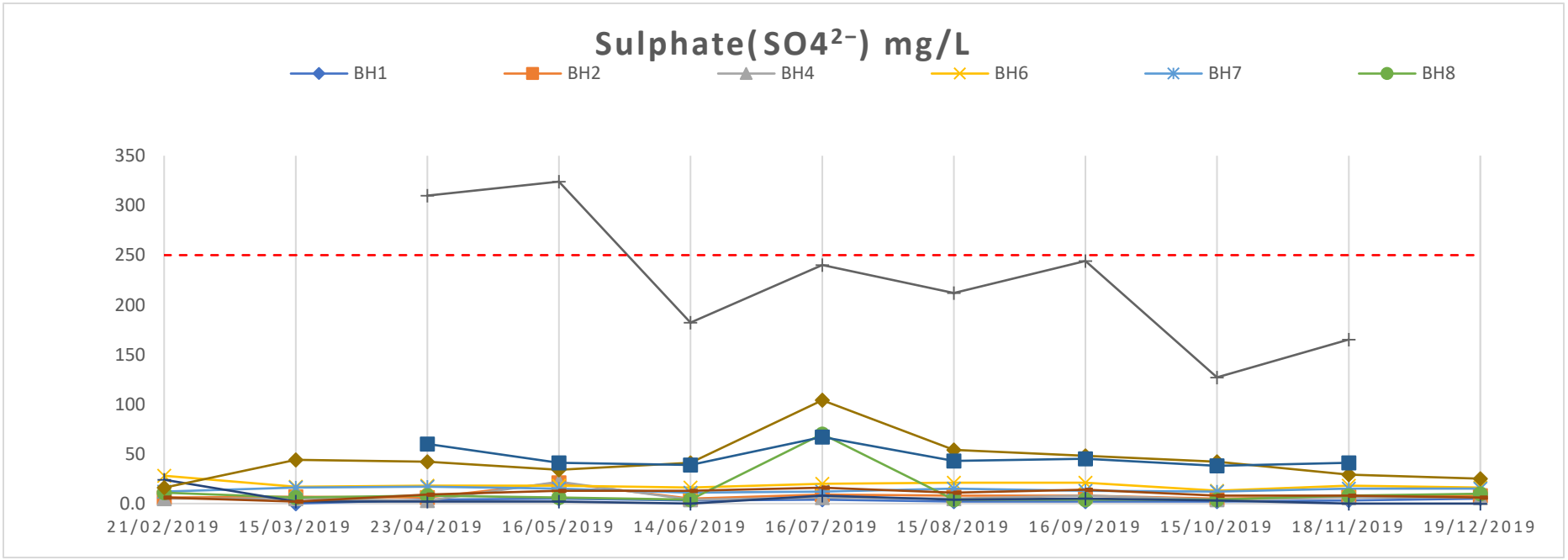
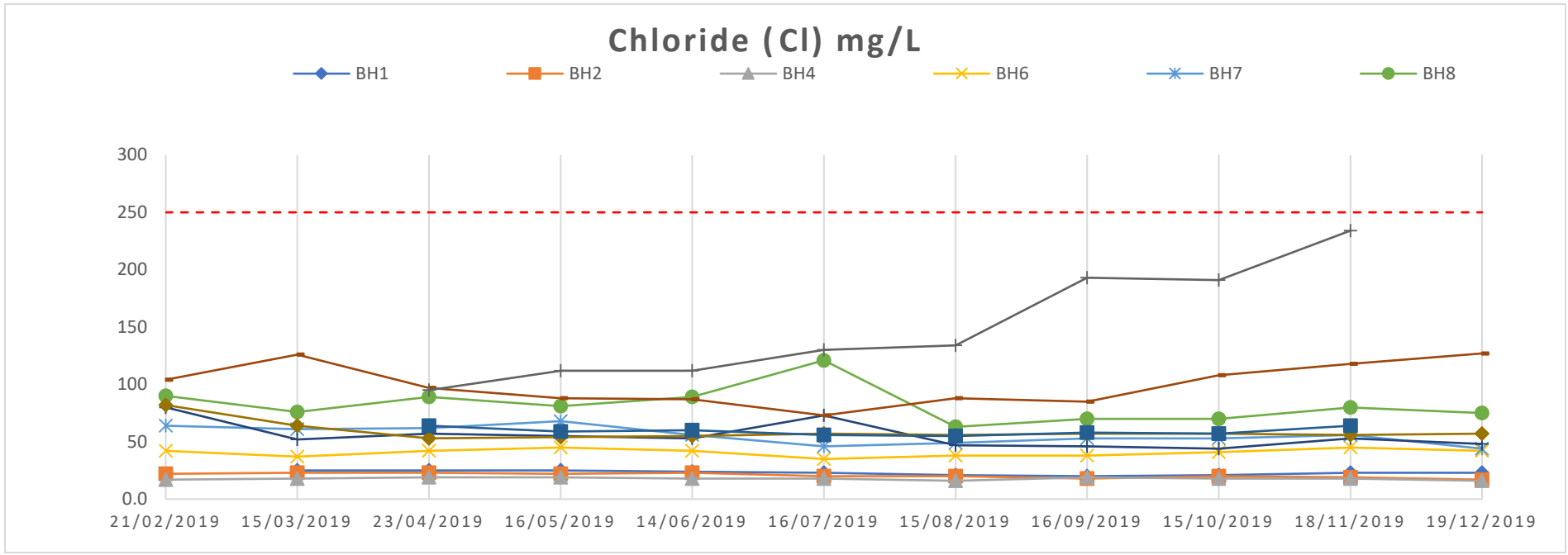
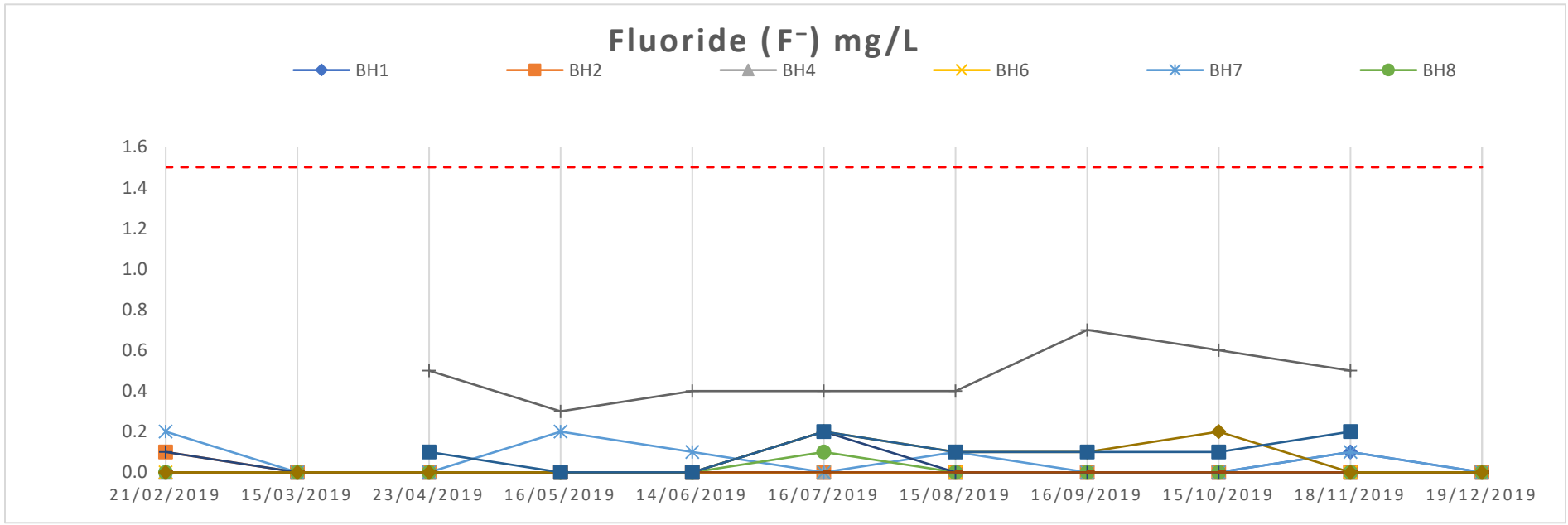
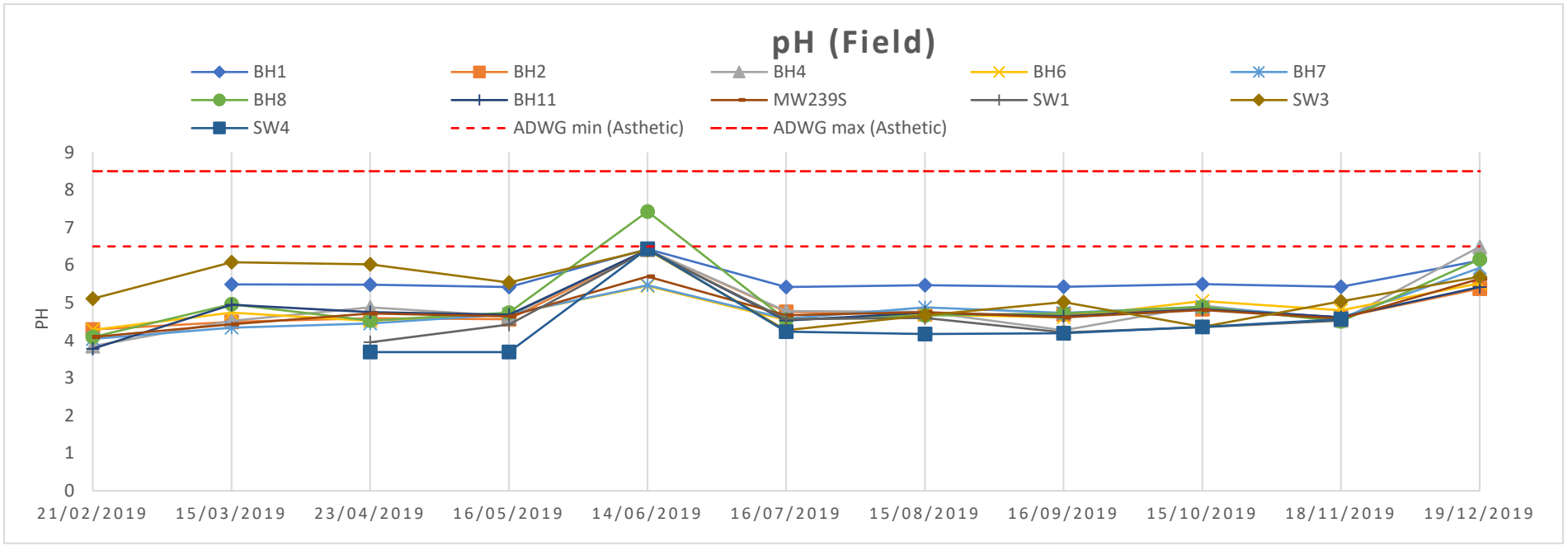
15/10/2019
18/11/2019
19/12/2019


Potassium(K) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Sulphate(SO4²⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Chloride (Cl) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


Fluoride (F⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019


pH (Field)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
PH
9
8
7
6
5
4
3
2
1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
19/12/2019

APPENDIX B12: JANUARY 2020

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NEWCASTLE OFFICE

04 February 2020
Document Ref: NCA20R106827

Williamtown Sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams
Delivered by email: darren@arbus.com.au

Subject: Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry – January 2020 monitoring

Please find enclosed the Monthly water quality monitoring results at Cabbage Tree Road Sand Quarry for the January 2020 monitoring.

1. SCOPE OF SERVICE

The scope of work includes the monthly surface and groundwater monitoring as part of the monthly monitoring requirements. **Figure 1** (attached) presents the surface water and groundwater sampling locations.

The January monitoring round was a monthly monitoring event and included gauging of all available monitoring wells (a total of 13 wells) and sampling from 8 monitoring wells (Noting that MW239D, BH3, BH5 and BH12 were not required to be sampled and BH9 and BH10 were dry). All surface water locations at the time of the monitoring event were dry therefore no additional sampling and subsequent water quality analyses were conducted

2. SITE WORK

The monthly monitoring round was conducted on 16 January 2020. A summary of these results are presented in **Table 3.4**. The results suggest that since quarry operations began in August 2019 there has been no immediate change in data trends as outlined in **Appendix B**.

Each well location was gauged using a water level meter to determine groundwater depth (relative to the top of the well casing) and the total depth of the well, in order to calculate the volume of water in the well. Following the gauging a HydraSleeve was then placed into the well ensuring the top of the sleeve was located under the water and left in place while all remaining wells were gauged. Following gauging, each of the HydraSleeves were removed and samples taken.

The January 2020 monitoring round included:

- Gauging of all available monitoring wells (a total of 13 wells), note that BH3 is now decommissioned;
- Groundwater sampling from a total of 8 monitoring wells (note MW239D, BH3, BH5 and BH12 did not require sampling, BH9 and BH10 were dry); and
- Surface water sampling (All surface water monitoring points [SW1, SW2, SW3 and SW4] were dry on the day of sampling).

Water samples were collected in laboratory supplied containers and placed in an ice chilled esky. The samples were then submitted to a NATA accredited laboratory under a chain of custody (COC) for the analytical schedule as per **Table 2-1**.

Table 2-1: Summary of Quarterly Water Quality Analysis

Analysis	Number of Samples				
	Primary	Intra-lab (Duplicate)	Inter-lab (Triplicate)	Transport Blank	Rinsate Blank
General Water Suite*	8	0	0	0	0
Hydrocarbons**	8	0	0	1	1
Metals***	8	0	0	1	1
Iron (dissolved)	8	0	0	1	1
Total Dissolved Solids (TDS)	8	0	0	0	0
Total Suspended Solids (TSS)	8	0	0	0	0
PFAS (28 analytes, standard level)	4	0	0	1	1

* General Water Suite: Ca, Mg, Na, K, pH, EC, Cl, SO_4, Alkalinity, Hardness & TDS (Calc')
** TRH (C6 – C40), BTEXN (Silica Gel)
*** NEPM Metals Suite (dissolved) - Arsenic (As), Boron (B), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Vanadium (V), Zinc (Zn).

3. SAMPLING RESULTS

Table 3-2 provides a summary of the gauging data and **Table 3-3** provides a summary of the field parameters taken during sampling. The full set of gauging data and field parameters for each monitoring location are provided in the **Tables** section.

Table 3-2: Summary of gauging data

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH1	8.64	6.701	1.939	8.28	Slight cloudy brown, no odour
BH2	7.79	6.153	1.637	9.03	Cloudy brown, slight sulfur odour
BH3	-	-	-	-	Well Decommissioned

Borehole	Top of Casing (mAHD)	Depth to Water (mBTOC)	Groundwater Elevation (mAHD)	Well Total Depth (mBTOC)	Comment
BH4	3.06	2.252	0.808	6.11	Slight cloudy brown, no odour
BH5	7.36	6.315	1.045	8.8	No odour - No sample taken.
BH6	3.62	2.169	1.451	4.62	Brown, no odour
BH7	2.98	2.169	0.811	4.61	Light brown, slight sulfur odour.
BH8	3.88	2.969	0.911	6.28	Cloudy brown, sulfur odour
BH9	17.75	Dry	-	16.01	Well was dry.
BH10	6.69	Dry	-	3.58	Well was dry.
BH11	6.63	3.962	2.668	5.39	Cloudy brown, sulfur odour
BH12	8.67	7.252	1.418	8.2	No sample taken.
MW239S	3.04	1.823	1.217	4.06	Dark brown, sulfur odour
MW239D	3.04	1.799	1.241	20.32	Slight Sulfur odour, no sample taken
SW01*	N/A	Dry		N/A	Location was dry
SW02*	N/A	Dry		N/A	Location was dry.
SW03*	N/A	Dry		N/A	Location was dry.
SW04*	N/A	Dry		N/A	Location was dry

* Surface water levels measured from measuring tape installed (When dry number is ground elevation AHD).

Table 3-3: Summary of field parameters

Sample ID	Time	Temp (°C)	EC (us/cm)	pH	Redox (mV)
BH01	1145	22.52	123	5.39	27.7
BH02	1130	24.49	94	4.84	186.5
BH04	1100	23.3	85	4.63	221
BH06	1320	24.62	190	4.39	92
BH07	1410	22.39	164	4.45	23.1
BH08	1440	21.99	284	4.08	45.6
BH11	1215	22.37	129	4.61	42
MW239S	1250	24.71	396	4.59	16.1

Table 3.4 presents a summary of the water monitoring results and comparison with identified trigger values. Full results tables are provided in the **Tables** Section. Full Laboratory results, including copies for the COC are provided in **Attachment A**.

Attachment B provides a graphical representation of trends in data acquired during field sampling and laboratory analysis. Data trends include; monthly rainfall totals versus mean rainfall totals, groundwater elevation (mAHD), field electrical conductivity (µs/cm), concentrations (mg/L) of chromium, copper, iron, nickel, zinc total nitrogen, total hardness, manganese, total phosphorus, total dissolved solids, sodium, calcium, magnesium,

potassium, sulphate, chloride and fluoride. Where relevant, the Australian Drinking Water Guideline (Aesthetic values) and ANZECC 2000 Guideline have been included to provide a benchmark for any exceedances recorded.

Table 3.4 Water screening levels

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
Physical and Chemical Stressors	Sodium	1	8	13	67	No	Similar
	Sulphate	1	8	<1	15	No	Similar
	Chloride	1	8	17	120	No	Similar
	Fluoride	0.1	8	<0.1	0.2	No	Similar
	Reactive [3] Phosphorous	0.01	0	-	-	-	-
	Total Phosphorous [3]	0.01	0	-	-	-	-
	Nitrite [3]	0.01	0	-	-	-	-
	Nitrate [3]	0.01	0	-	-	-	-
	Ammonia [3]	0.01	0	-	-	-	-
	Total Nitrogen [3]	0.1	0	-	-	-	-
	Total Hardness	1	8	12	33	No	Similar
	Total Dissolved Solids	1	8	55	275	No	Similar
	pH	0.01	8	5.02	6.23	All outside ANZECC 2000 Trigger range[1] and drinking water guidelines	Similar
Dissolved Metals	As	0.001	8	<0.001	<0.001	No	Similar
	B	0.05	8	<0.005	<0.005	No	Similar
	Ba	0.001	8	0.003	0.032	No	Similar
	Be	0.001	8	<0.001	<0.001	No	Similar
	Cd	0.005-0.1	8	<0.0001	<0.0001	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	Cr	0.005-0.1	8	<0.001	0.002	5 above ANZECC 2000 Trigger Values[2] (BH1, BH7, BH8, BH11 and MW239S)	Similar
	Co	0.001	8	<0.001	<0.001	No	Similar
	Cu	0.001	8	<0.001	0.006	3 above ANZECC 2000 Trigger Values[2] (BH1, BH2 and BH4)	General decrease in concentrations following a spike in September 2019.
	Fe	0.05	8	<0.05	4.43	7 above NHMRC ADWG 6 aesthetics (BH1, BH2, BH6, BH7, BH8, BH11 and MW239S)	Similar
	Mn	0.001	8	0.004	0.014	No	Similar
	Ni	0.001	8	<0.001	0.003	No	Similar
	Pb	0.005-0.1	8	<0.001	<0.001	No	Similar
	Se	0.005-0.1	8	<0.01	<0.01	No	Similar
	V	0.005-0.1	8	<0.01	<0.01	No	Similar
	Zn	0.005-0.1	8	<0.005	0.044	4 above ANZECC 2000 Trigger Values[2] (BH1, BH2, BH4 and BH8)	Slight increase in concentrations at most locations.
	Hg	0.0001	8	<0.0001	<0.0001	No	Similar
TRH – Silica Clean up	C_6-C_{10}	0.02	8	<0.02	<0.02	No	Similar
	>C_{10}-C_{16}	0.1	8	<0.1	<0.1	No	Similar
	>C_{16}-C_{34}	0.1	8	<0.1	<0.1	No	Similar
	>C_{34}-C_{40}	0.1	8	<0.1	<0.1	No	Similar
	Total >C_{10}-C_{40}	0.1	8	<0.1	<0.1	No	Similar
	C_6-C_{10} minus BTEX (F1)	0.02	8	<0.02	<0.02	No	Similar

Analytical Groupings	Analyte	Limit of reporting (mg/L)	Number of Samples	Minimum (mg/L)	Maximum (mg/L)	Criteria Exceeded	Relative to previous monitoring (Refer to Trend Data Attachment B)
	>C_{10}-C_{16} minus Naphthalene (F2)	0.1	8	<0.1	<0.1	No	Similar
BTEX	Benzene	0.001-0.005	8	<0.001	<0.001	No	Similar
	Toluene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Ethylbenzene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Total Xylene	0.001-0.005	8	<0.002	<0.002	No	Similar
	Naphthalene	0.001	8	<0.005	<0.005	No	Similar
PFAS	PFOS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOA	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar
	PFOS/PFHxS	0.00001-0.0001	4	<0.00001	<0.00001	No	No detection of PFOS/PFHxS in all samples taken
	PFDS	0.00001-0.0001	4	<0.00001	<0.00001	No	Similar

* The LOR is above the Heads of EPA Australia and New Zealand – National Environmental Management Plan (HEPA NEMP) 2018 99% Level of protection in freshwater. No concentrations were found to be above the LOR.
[1]Australian and New Zealand Environmental Conservation Council (ANZECC) 2000 Trigger Values – Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
[2]ANZECC 2000 Trigger Values – 95% Level of protection in freshwater
National Health and Medical Research Council Australian Drinking Water Guidelines (NHMRC ADWG) 6 2011 Version 3.5 Updated August 2018
[3]Analysis only undertaken during Quarterly Sampling Event.

4. RAINWATER DATA

Table 4.5 presents the rainfall data from Williamtown RAAF base (Station Number: 061078, Latitude: 32.79°S; Longitude: 151.84°E; Elevation: 8 m). The mean monthly rainfall indicates that there was less rainfall in the December/January period than the mean leading up to the January 2020 monitoring event. January rainfall is trending towards below average rainfall. Based on current rainfall data (mean and monthly totals) for December 2019 it is expected that surface and groundwater levels will continue to decrease.

Table 4.5 2019/20 Rainfall data

2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1st	2.0	0.8	0	0	0	0	0	9.6	7.4	0	0	0	0
2nd	0	12.8	0	23.8	0	21.2	0	0	0.2	0	0	0	0
3rd	0	0.4		0.6	0	0.6	0	0.2	0	0	0	0	0
4th	0	0	0	0	20.8	0.4	5.2	0	0	0	17.6	0	0
5th	0	0	0	0	0.2	25	1.8	0.2	0	0	0.4	0	0
6th	0	0	0	0	23.2	2.6	1.2	0	0	6.8	0	0	0
7th	5.0	0	8.2	0	0.2	1	0.6	0	1	0	0	0	0
8th	0	0	0	0	0	0	1.6	0	0	0	0	0	0.2
9th	0	6.6	0	0	0	0	0.4	0	0	0.8	0	0	0.2
10th	0.2	0	12.0	2.2	0	0	0	0	0.6	1.4	0	0	0
11th	0	0	0	0	0.6	0	0	0	2.8	4	0	0	0.2
12th	3.0	0	0	0	0	0	0	0	0	23	0	0	1.4
13th	0	0	0	0	1.4	0	0	0	0	8.8	0	0	0.4
14th	0	0	0	0.2	0	0	0	0	0	0	0	0	0
15th	0	0	0	1.4	0	0	0	0	0	0	0	0	0
16th	0	0	4.8	3.6	0	0	0	0	0	0.2	0	0	0
17th	0	0	59.4	1.4	0	0	0	0	16.8	0	0	0	
18th	0	0	2.6	0.2	0	17.8	0	0	39.4	0	0	0	
19th	0	0	2.2	0.2	0	0	0	0	7.2	0	0	0	
20th	2.4		0	2.0	0	0	0	0	0	0	0	0	
21st	1.0	1.4	0	0.2	0	0	0	0	0	0	0	0	
22nd	0	1.0	1.2	0.2	0	0.2	0	0	0	0	0	0	
23rd	0	1.4	0	0	0	20	0	0		0	1	0.2	
24th	0	9.2	5.4	0	0	50.6	0	0	0	0	1.6	0.4	
25th	0	0	5.2	0	0	15.2	2.0	0	0	0	0	0	
26th	0	0	0	0	0	1.8	0	0	0	0	31.2	0.2	
27th	0	0	0	0	0	0.8	0	0	0	0	0	0	
28th	1.0	0	0	0	0.8	0	0	0	0	0	0	0	
29th	0		0	0	0	0	0	0	0	0	0	0	
30th	0		38.2	0	0	0	0.6	21.2	0	0	0	0	
31st	0		6.6		0		10	67.4				0	
Total	**14.6**	**33.6**	**145.8**	**36.0**	**47.2**	**157.2**	**23.4**	**98.6**	**75.4**	**44.8**	**51.8**	**0.8**	**1.4**
Mean	**98.7**	**117.0**	**120.5**	**111.6**	**109.6**	**124.7**	**70.3**	**73.2**	**60.6**	**73.5**	**82.3**	**77.5**	**98.7**

5. THANKYOU

We trust the information presented is acceptable. If you have any questions, please do not hesitate in contacting the undersigned.

Sincerely,

Kleinfelder Australia Pty Ltd

Daniel Kousbroek B.Env.Sc (Hons)

Environmental Consultant
Contaminated Land Management
Dkousbroek@kleinfelder.com

Mobile: 0458 197 676

Attached:

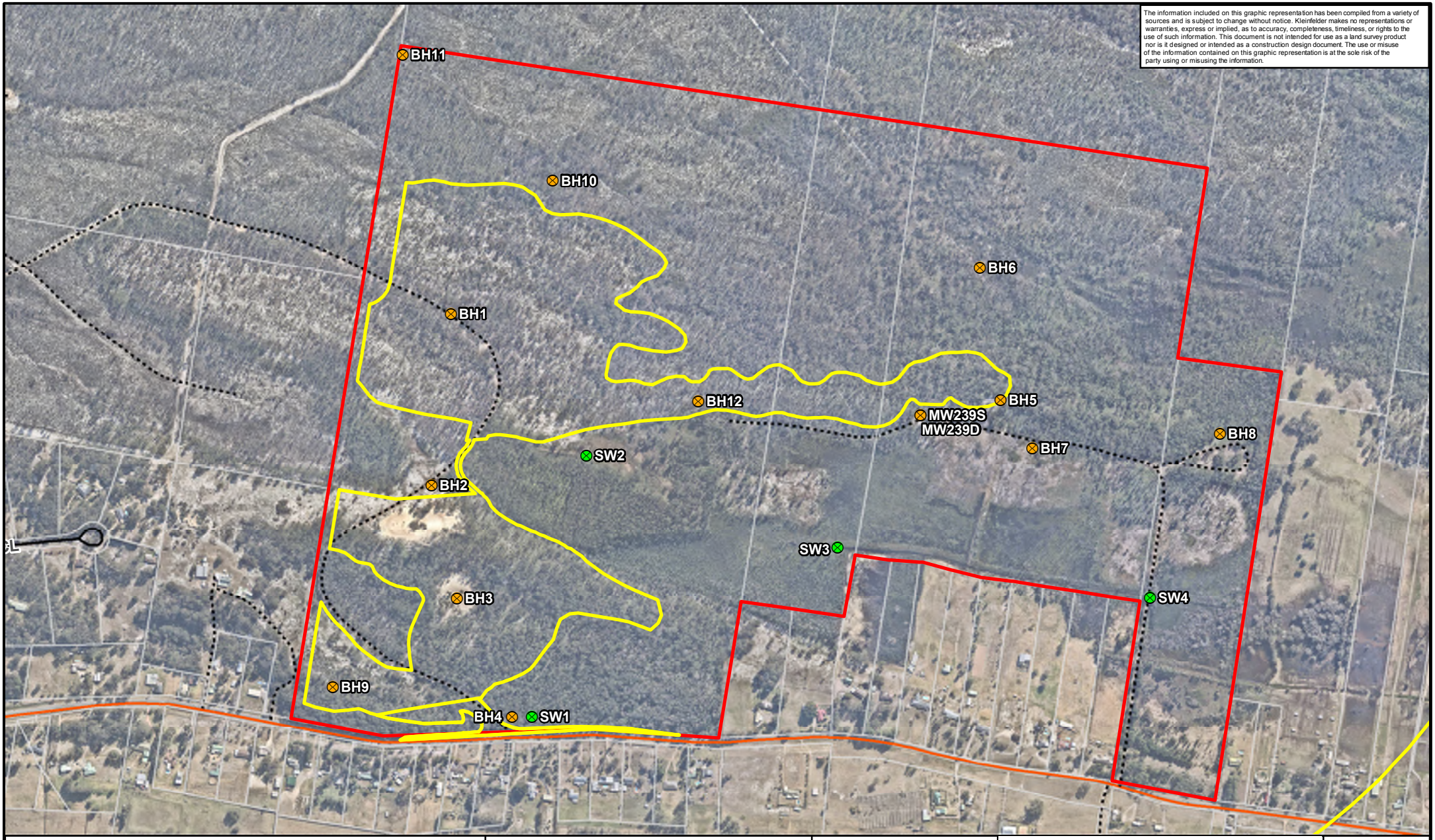
Figure 1

Data Tables

Attachment A – Laboratory reports

Attachment B – Data Trends

FIGURE 1



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- Groundwater Sample Site
- Surface Water Sample Site
- Subject Land Boundary
- Quarry Project Area
- Arterial Road
- Local Road
- Track

Metres
0 50 100 200 300 400 500
N

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PROJECT REFERENCE: 20170448
DATE DRAWN: 13/02/2019 09:48 Version 1
DRAWN BY: gjoyce

DATA SOURCE:
NSW DFSI - 2017
Nearmap - 2018

Water monitoring locations
January 2020 Monitoring

Williamtown Sand Syndicate
Proposed Sand Quarry
Cabbage Tree Road, Williamtown

FIGURE:
1

L:\GIS FOLDER\00 CLIENT FILES\126863_TrusteeForWSS_UnitTrust\20170448_Williamtown\Mapping\20170448_WMP_Fig2_WaterMonitoringPlan.mxd

DATA TABLES

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH1	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**1,710**	< 50	< 100	< 50	< 50	**1,690**	**1,690**	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	**40**	< 50	< 100	< 50	< 50	**30**	**30**	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH11	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH2	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH3	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH4	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**250**	< 50	**250**	< 20	< 20	< 100	< 100	**280**	< 100	**280**
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	**130**	< 50	**130**	< 20	< 20	< 100	< 100	**140**	< 100	**140**
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH5	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH6	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
BH7	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	21-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Table 1
Groundwater Analytical Data - BTEXN
Williamtown Sand Syndicate

Analyte		BTEXN								Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons - Silcia Clean up				Total Recoverable Hydrocarbons		Total Recoverable Hydrocarbons - Silcia Clean up				
		Benzene**	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene**	Total Xylenes	Naphthalene **	Sum of BTEX	C_6 - C_9	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup	C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10}-C_{16} - Silica Cleanup	F2 - Silica Cleanup	>C_{16}-C_{34} - Silica Cleanup	>C_{34}-C_{40} - Silica Cleanup	>C_{10}-C_{40} - Silica Cleanup
LOR		1	2	2	2	2	2	5	1	20	50	100	50	50	20	20	100	100	100	100	100
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC 2000 Trigger Values		950	-	-	-	350		16													
NHMRC ADWG 6		1	800	300	-	350	600														
Sample Name	Sample Date																				
BH8	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
MW239S	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jan-20	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW1	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW3	22-Feb-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Mar-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	17-Dec-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
SW4	23-Apr-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-May-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	14-Jun-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Jul-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Aug-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	16-Sep-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	15-Oct-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100
	18-Nov-19	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	< 20	< 20	< 100	< 100	< 100	< 100	< 100

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalen

** 95% Level of protection in freshwater

Table 2
Groundwater Analytical Data - Metals
Williamtown Sand Syndicate

Analyte		Metals														
		Arsenic**	Barium	Beryllium	Boron**	Cadmium**	Chromium**[1]	Cobalt	Copper**	Iron	Lead**	Manganese**	Mercury**[2]	Nickel**	Selenium**	Vanadium	Zinc**
LOR		0.001	0.001	0.001	0.05	0.0001	0.001	0.001	0.001	0.05	0.001	0.001	0.0001	0.001	0.01	0.01	0.005
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC 2000 Trigger Values		0.013		-	0.37	0.0002	0.001	-	0.0014	-	0.0034	1.9	0.0006	0.011	0.011	-	0.008
NHMRC ADWG 6		0.01		0.06	4	0.002	0.05	-	2	0.3[3]	0.01	0.5	0.001	0.02	0.01	-	3[3]
Sample Name	Sample Date																
BH1	15-Mar-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**13**	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**1.27**
	23-Apr-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.002**	**10**	**0.001**	**0.015**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.363**
	16-May-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	< 0.001	**8.33**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.132**
	14-Jun-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**6.31**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.074**
	16-Jul-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.35**	< 0.001	**0.01**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.116**
	15-Aug-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.002**	**7.96**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.023**
	16-Sep-19	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	**0.001**	**8.84**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.034**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.003**	< 0.001	**0.006**	**4.32**	< 0.001	**0.007**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.037**
	18-Nov-19	< 0.001	**0.001**	< 0.001	< 0.05	< 0.0001	**0.004**	< 0.001	< 0.001	**11**	< 0.001	**0.008**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.012**
	17-Dec-19	<0.001	**0.002**	<0.001	<0.05	<0.0001	**0.003**	<0.001	0.001	**8.48**	<0.001	**0.009**	<0.0001	<0.001	<0.01	<0.01	**0.028**
	16-Jan-20	<0.001	**0.003**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.002**	**4.43**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.044**
BH11	21-Feb-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.001**	< 0.001	**0.26**	< 0.001	**0.003**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.031**
	15-Mar-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.49**	< 0.001	**0.007**	< 0.0001	**0.037**	< 0.01	< 0.01	**0.016**
	23-Apr-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.98**	< 0.001	**0.007**	< 0.0001	**0.07**	< 0.01	< 0.01	**0.04**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.97**	< 0.001	**0.006**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.024**
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.98**	< 0.001	**0.005**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.47**	< 0.001	**0.003**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.001**	**0.87**	< 0.001	**0.007**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.005**
	16-Sep-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**0.79**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.012**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.004**	**0.74**	< 0.001	**0.006**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	18-Nov-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.95**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.004**	<0.001	**0.06**	<0.0001	**0.002**	<0.001	**0.002**	**1**	<0.001	**0.008**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.005**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**1.08**	<0.001	**0.007**	<0.0001	**0.003**	<0.01	<0.01	**0.005**
BH2	22-Feb-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.14**	< 0.001	**0.021**	< 0.0001	**0.015**	< 0.01	< 0.01	**0.006**
	15-Mar-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.003**	< 0.05	< 0.001	**0.02**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	23-Apr-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.19**	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.06**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.004**	**0.08**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.05**	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	15-Aug-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.012**	**0.08**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**0.26**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	15-Oct-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.006**	**0.46**	< 0.001	**0.011**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	18-Nov-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.013**	**0.08**	< 0.001	**0.011**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.028**
	17-Dec-19	<0.001	**0.004**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.006**	**0.1**	<0.001	**0.012**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.004**	<0.001	<0.05	<0.0001	<0.001	<0.001	**0.005**	**0.73**	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.01**
BH3	21-Feb-19	< 0.001	**0.003**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.06**	< 0.001	**0.005**	< 0.0001	**0.053**	< 0.01	< 0.01	< 0.005
BH4	21-Feb-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**0.16**	< 0.001	**0.039**	< 0.0001	**0.018**	< 0.01	< 0.01	**0.014**
	15-Mar-19	< 0.001	**0.014**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	< 0.05	< 0.001	**0.014**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.043**
	23-Apr-19	< 0.001	**0.013**	< 0.001	**0.05**	< 0.0001	< 0.001	< 0.001	**0.002**	**0.99**	< 0.001	**0.045**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.008**
	16-May-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**0.27**	< 0.001	**0.022**	< 0.0001	**0.022**	< 0.01	< 0.01	**0.011**
	14-Jun-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.038**	< 0.05	< 0.001	**0.014**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	16-Jul-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.046**	< 0.05	< 0.001	**0.019**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	15-Aug-19	< 0.001	**0.013**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.026**	< 0.05	< 0.001	**0.018**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.051**	**0.19**	< 0.001	**0.026**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.005**
	15-Oct-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.011**	**0.31**	< 0.001	**0.136**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.014**
	18-Nov-19	< 0.001	**0.011**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.005**	< 0.05	< 0.001	**0.013**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.012**	<0.001	**0.06**	<0.0001	**0.001**	<0.001	**0.008**	<0.05	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.005**
	16-Jan-20	<0.001	**0.014**	<0.001	<0.05	<0.0001	<0.001	<0.001	**0.006**	<0.05	<0.001	**0.014**	<0.0001	<0.001	<0.01	<0.01	**0.009**
BH5	22-Feb-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.4**	< 0.001	**0.005**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.008**
BH6	22-Feb-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.03**	< 0.001	**0.014**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.9**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.012**
	23-Apr-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**0.96**	< 0.001	**0.01**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.022**
	16-May-19	< 0.001	**0.029**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**2.57**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.027**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.86**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.008**
	16-Jul-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.002**	**2.41**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.005**
	15-Aug-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.001**	**2.19**	< 0.001	**0.008**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.007**
	16-Sep-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	**0.008**	**2.08**	< 0.001	**0.012**	< 0.0001	**0.007**	< 0.01	< 0.01	**0.035**
	15-Oct-19	< 0.001	**0.026**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.95**	< 0.001	**0.009**	< 0.0001	< 0.001	< 0.01	< 0.01	**0.006**
	18-Nov-19	< 0.001	**0.03**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**1.58**	< 0.001	**0.009**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.073**
	17-Dec-19	<0.001	**0.026**	<0.001	**0.05**	<0.0001	**0.001**	<0.001	**0.003**	**1.78**	<0.001	**0.007**	<0.0001	**0.001**	<0.01	<0.01	**0.006**
	16-Jan-20	<0.001	**0.032**	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	**2.15**	<0.001	**0.01**	<0.0001	<0.001	<0.01	<0.01	<0.005
BH7	22-Feb-19	< 0.001	**0.004**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**1.8**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.019**
	14-Mar-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	**0.003**	< 0.001	**1.8**	< 0.001	**0.02**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.0**	< 0.001	**0.026**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.01**
	16-May-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.003**	< 0.001	**2.32**	< 0.001	**0.035**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.013**
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**2.06**	< 0.001	**0.03**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.006**
	16-Jul-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.66**	< 0.001	**0.025**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.54**	< 0.001	**0.023**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.016**	< 0.001	**0.06**	< 0.0001	**0.002**	**0.002**	**0.007**	**1.42**	**0.001**	**0.024**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.009**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	**0.003**	**1.32**	< 0.001	**0.018**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.016**	< 0.001	< 0.05	< 0.0001	**0.002**	**0.002**	< 0.001	**1.1**	< 0.001	**0.015**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.009**	<0.001	**0.06**	<0.0001	**0.002**	**0.001**	<0.001	**0.98**	<0.001	**0.011**	<0.0001	**0.003**	<0.01	<0.01	**0.007**
	16-Jan-20	<0.001	**0.01**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**0.93**	<0.001	**0.006**	<0.0001	**0.003**	<0.01	<0.01	**0.007**
BH8	21-Feb-19	**0.001** *	**0.011**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**4.1**	< 0.001	**0.012**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.25**	< 0.001	**0.008**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	23-Apr-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.2**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.008**
	16-May-19	**0.003**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**3.0**	< 0.001	**0.01**	< 0.0001	**0.003**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.5**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.006**
	16-Jul-19	**0.001**	**0.012**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	**0.001**	**0.008**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**1.72**	< 0.001	**0.004**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Sep-19	**0.001**	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**2.06**	< 0.001	**0.005**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Oct-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	**0.002**	**2.08**	< 0.001	**0.009**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.012**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**2.49**	< 0.001	**0.01**	< 0.0001	**0.013**	< 0.01	< 0.01	**0.053**
	17-Dec-19	<0.001	**0.007**	<0.001	**0.05**	<0.0001	**0.002**	<0.001	**0.003**	**3.02**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.007**
	16-Jan-20	<0.001	**0.007**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**2.94**	<0.001	**0.011**	<0.0001	**0.002**	<0.01	<0.01	**0.011**
MW239S	22-Feb-19	< 0.001	**0.007**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.11**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	**0.006**
	14-Mar-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.25**	< 0.001	**0.005**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.008**
	23-Apr-19	< 0.001	**0.008**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.01**	< 0.001	**0.004**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.007**
	16-May-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	14-Jun-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.8**	< 0.001	**0.003**	< 0.0001	**0.001**	< 0.01	< 0.01	< 0.005
	16-Jul-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**0.87**	< 0.001	**0.003**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005
	15-Aug-19	< 0.001	**0.006**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.0**	< 0.001	**0.004**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	16-Sep-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.002**	**0.94**	< 0.001	**0.006**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.032**
	15-Oct-19	< 0.001	**0.005**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	**0.003**	**0.68**	< 0.001	**0.004**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.011**
	18-Nov-19	< 0.001	**0.01**	< 0.001	< 0.05	< 0.0001	**0.002**	< 0.001	< 0.001	**1.1**	< 0.001	**0.004**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.03**
	17-Dec-19	<0.001	**0.008**	<0.001	<0.05	<0.0001	**0.003**	<0.001	**0.001**	**1.33**	<0.001	**0.003**	<0.0001	**0.002**	<0.01	<0.01	<0.005
	16-Jan-20	<0.001	**0.008**	<0.001	<0.05	<0.0001	**0.002**	<0.001	<0.001	**1.31**	<0.001	**0.004**	<0.0001	**0.002**	<0.01	<0.01	**0.007**
SW1	23-Apr-19	< 0.001	**0.043**	< 0.001	**0.14**	< 0.0001	< 0.001	**0.017**	**0.002**	**4.16**	< 0.001	**0.841**	< 0.0001	**0.02**	< 0.01	< 0.01	**0.356**
	16-May-19	< 0.001	**0.029**	< 0.001	**0.1**	< 0.0001	< 0.001	**0.01**	**0.003**	**7.25**	< 0.001	**0.666**	< 0.0001	**0.012**	< 0.01	< 0.01	**0.077**
	14-Jun-19	< 0.001	**0.029**	< 0.001	**0.09**	**0.0002**	< 0.001	**0.009**	**0.006**	**2.75**	< 0.001	**0.595**	< 0.0001	**0.011**	< 0.01	< 0.01	**0.535**
	16-Jul-19	< 0.001	**0.032**	< 0.001	**0.08**	**0.0001**	< 0.001	**0.007**	**0.003**	**1.86**	< 0.001	**0.59**	< 0.0001	**0.008**	< 0.01	< 0.01	**0.239**
	15-Aug-19	< 0.001	**0.027**	< 0.001	**0.09**	< 0.0001	< 0.001	**0.005**	**0.003**	**2.15**	< 0.001	**0.482**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.075**
	16-Sep-19	< 0.001	**0.056**	< 0.001	**0.09**	**0.0002**	**0.001**	**0.008**	**0.012**	**2.45**	**0.001**	**0.587**	< 0.0001	**0.014**	< 0.01	< 0.01	**0.282**
	15-Oct-19	< 0.001	**0.036**	< 0.001	**0.07**	< 0.0001	< 0.001	**0.005**	**0.003**	**1.61**	< 0.001	**0.383**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.055**
	18-Nov-19	< 0.001	**0.042**	< 0.001	**0.11**	< 0.0001	**0.001**	**0.003**	< 0.001	**1.14**	< 0.001	**0.366**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.026**
SW3	22-Feb-19	**0.003**	**0.075**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**4.84**	< 0.001	**0.033**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.016**
	14-Mar-19	**0.006**	**0.08**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	< 0.001	**9.26**	< 0.001	**0.048**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	23-Apr-19	< 0.001	**0.043**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**2.01**	< 0.001	**0.046**	< 0.0001	**0.004**	< 0.01	< 0.01	**0.016**
	16-May-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.78**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.012**
	14-Jun-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	**0.001** *	**0.003**	< 0.001	**1.68**	< 0.001	**0.038**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.016**
	16-Jul-19	< 0.001	**0.055**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.007**	**0.002**	**1.25**	< 0.001	**0.043**	< 0.0001	**0.006**	< 0.01	< 0.01	**0.029**
	15-Aug-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.002**	**1.16**	< 0.001	**0.036**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.013**
	16-Sep-19	< 0.001	**0.045**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.004**	**0.02**	**0.69**	**0.001**	**0.036**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.094**
	15-Oct-19	< 0.001	**0.034**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.005**	**0.002**	**1.7**	< 0.001	**0.027**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.022**
	18-Nov-19	< 0.001	**0.031**	< 0.001	< 0.05	< 0.0001	**0.001**	< 0.001	< 0.001	**2.6**	< 0.001	**0.026**	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
	17-Dec-19	<0.001	**0.041**	<0.001	<0.05	<0.0001	**0.002**	<0.001	**0.003**	**1.42**	<0.001	**0.026**	<0.0001	**0.001**	<0.01	<0.01	<0.005
SW4	23-Apr-19	< 0.001	**0.059**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.003**	**0.003**	**2.09**	< 0.001	**0.037**	< 0.0001	**0.005**	< 0.01	< 0.01	**0.03**
	16-May-19	< 0.001	**0.047**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	< 0.001	**1.12**	< 0.001	**0.03**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.019**
	14-Jun-19	< 0.001	**0.041**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.003**	**0.79**	< 0.001	**0.034**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	16-Jul-19	< 0.001	**0.044**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.002**	**0.96**	< 0.001	**0.043**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.014**
	15-Aug-19	< 0.001	**0.04**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.001**	**0.001**	**0.57**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	**0.009**
	16-Sep-19	< 0.001	**0.046**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.02**	**0.7**	**0.001**	**0.039**	< 0.0001	**0.017**	< 0.01	< 0.01	**0.085**
	15-Oct-19	< 0.001	**0.037**	< 0.001	< 0.05	< 0.0001	< 0.001	**0.002**	**0.004**	**0.66**	< 0.001	**0.031**	< 0.0001	**0.003**	< 0.01	< 0.01	**0.018**
	18-Nov-19	< 0.001	**0.035**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	**6.32**	< 0.001	**0.032**	< 0.0001	**0.002**	< 0.01	< 0.01	< 0.005

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
mg/L - Milligrams per litre
Bold indicates a detection above the laboratory limit of reporting
"*" denotes duplicate/triplicate sample result adopted for analytical use due to RPD >50%
RPD - Relative Percentage Difference

** 95% Level of protection in freshwater
[1] value for CR VI
[2] as inorganioc
[3] Aesthetic

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte		Perfluoroalkyl Sulfonic Acids						Perfluoroalkyl Carboxylic Acids									
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)
LOR		0.02	0.02	0.02	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6												0.56					
HEPA NEMP 2018***						0.00023						19					
HEPA NEMP 2018[4]												5.6					
Sample Name	Sample Date																
BH11	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH2	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH3	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH4	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	**0.02**	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	<0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH5	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH6	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH7	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
BH8	21-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Mar-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	23-Apr-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	14-Jun-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jul-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Aug-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	15-Oct-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	17-Dec-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Jan-20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
MW239S	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW1	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW3	22-Feb-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
SW4	16-May-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	16-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.03 ***	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	25-Sep-19	< 0.02	< 0.02	< 0.02	< 0.02	**0.05**	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	18-Nov-19	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
µg/L - Micrograms per litre

*** 99% Level of protection in freshwater
[4] Recreation water

Table 3
Groundwater Analytical Data - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonamides							(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS	
		Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)
LOR		0.05	0.02	0.05	0.05	0.05	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.01	0.01
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
NHMRC ADWG 6														0.07	
HEPA NEMP 2018***															
HEPA NEMP 2018[4]														0.7	
Sample Name	Sample Date														
BH11	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH2	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH3	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH4	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	25-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH5	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH6	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	**0.19**	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH7	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
BH8	21-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Mar-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	23-Apr-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	14-Jun-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jul-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Aug-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	15-Oct-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	17-Dec-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Jan-20	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
MW239S	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW1	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW3	22-Feb-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
SW4	16-May-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01
	16-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.03 ***	**0.01**
	25-Sep-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	**0.05**	**0.05**
	18-Nov-19	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reporti
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Analyte		Sum of PFAS
LOR		0.01
Units		µg/L
NHMRC ADWG 6		
HEPA NEMP 2018***		
HEPA NEMP 2018[4]		
Sample Name	Sample Date	
BH11	21-Feb-19	< 0.01
BH2	22-Feb-19	< 0.01
BH3	21-Feb-19	< 0.01
BH4	21-Feb-19	< 0.01
	15-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	**0.02**
	25-Sep-19	**0.02**
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH5	22-Feb-19	< 0.01
BH6	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	**0.19**
	16-Jan-20	< 0.01
BH7	22-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
BH8	21-Feb-19	< 0.01
	14-Mar-19	< 0.01
	23-Apr-19	< 0.01
	16-May-19	< 0.01
	14-Jun-19	< 0.01
	16-Jul-19	< 0.01
	15-Aug-19	< 0.01
	16-Sep-19	< 0.01
	15-Oct-19	< 0.01
	18-Nov-19	< 0.01
	17-Dec-19	< 0.01
	16-Jan-20	< 0.01
MW239S	22-Feb-19	< 0.01
SW1	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW3	22-Feb-19	< 0.01
	16-May-19	< 0.01
	16-Sep-19	< 0.01
	18-Nov-19	< 0.01
SW4	16-May-19	< 0.01
	16-Sep-19	**0.01**
	25-Sep-19	**0.05**
	18-Nov-19	< 0.01

Notes:
- - Not analysed
< - Less than laboratory limit of reportir
µg/L - Micrograms per litre

*** 99% Level of protection in freshwa
[4] Recreation water

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																		
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*				
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]					
Sample Name	Sample Date																		
BH1	15-Mar-19	11	2.0	1.0	< 1.0	< 1.0	25	< 0.1	-	-	-	-	-	-	-	-	0.66	0.88	-
	23-Apr-19	14	1.0	2.0	< 1.0	4.0	25	< 0.1	-	-	-	-	-	-	-	-	0.82	0.99	-
	16-May-19	12	< 1.0	2.0	< 1.0	5.0	25	< 0.1	0.03	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.3	0.3	0.69	1.01	-
	14-Jun-19	10	< 1.0	2.0	< 1.0	3.0	24	< 0.1	-	-	-	-	-	-	-	-	0.6	0.94	-
	16-Jul-19	15	< 1.0	2.0	< 1.0	4.0	23	< 0.1	-	-	-	-	-	-	-	-	0.82	0.95	-
	15-Aug-19	14	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.77	0.91	-
	16-Sep-19	13	< 1.0	2.0	< 1.0	2.0	20	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.12	0.3	0.3	0.73	0.76	-
	15-Oct-19	13	< 1.0	2.0	< 1.0	2.0	21	< 0.1	-	-	-	-	-	-	-	-	0.73	0.71	-
	18-Nov-19	16	< 1.0	2.0	< 1.0	3.0	23	0.1	< 0.01	< 0.01	< 0.01	0.01	0.01	0.13	0.3	0.3	0.86	1.19	-
	17-Dec-19	14	<1	2	<1	5	23	<0.1	-	-	-	-	-	-	-	-	0.77	1.05	-
	16-Jan-20	16	<1	3	<1	3	25	<0.1	-	-	-	-	-	-	-	-	0.94	1.21	-
BH11	21-Feb-19	48	< 1.0	10	< 1.0	24	80	0.1	< 0.01	0.03	< 0.01	0.04	0.04	0.06	1.8	1.8	2.91	2.76	-
	15-Mar-19	26	< 1.0	2.0	< 1.0	2.0	52	< 0.1	-	-	-	-	-	-	-	-	1.3	1.51	-
	23-Apr-19	32	< 1.0	5.0	< 1.0	2.0	57	< 0.1	-	-	-	-	-	-	-	-	1.8	1.65	-
	16-May-19	29	< 1.0	4.0	< 1.0	2.0	55	< 0.1	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.12	0.4	0.4	1.59	1.59	-
	14-Jun-19	26	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	-	-	-	-	-	-	-	-	1.38	1.5	-
	16-Jul-19	49	< 1.0	8.0	< 1.0	8.0	73	0.2	-	-	-	-	-	-	-	-	2.79	2.22	-
	15-Aug-19	28	< 1.0	3.0	< 1.0	4.0	47	< 0.1	-	-	-	-	-	-	-	-	1.46	1.41	-
	16-Sep-19	27	< 1.0	3.0	< 1.0	5.0	46	< 0.1	< 0.01	0.12	< 0.01	< 0.01	< 0.01	0.15	0.7	0.7	1.42	1.4	-
	15-Oct-19	28	< 1.0	3.0	< 1.0	3.0	44	< 0.1	-	-	-	-	-	-	-	-	1.46	1.3	-
	18-Nov-19	28	< 1.0	3.0	< 1.0	< 1.0	53	< 0.1	< 0.01	2.11	< 0.01	0.06	0.06	0.18	5.9	5.8	1.46	1.5	-
	17-Dec-19	26	<1	4	<1	<1	48	<0.1	-	-	-	-	-	-	-	-	1.46	1.39	-
	16-Jan-20	25	<1	3	<1	<1	46	<0.1	-	-	-	-	-	-	-	-	1.33	1.34	-
BH2	22-Feb-19	12	2.0	2.0	< 1.0	6.0	22	0.1	< 0.01	0.28	< 0.01	2.76	2.76	0.05	4.0	1.2	0.79	0.74	-
	15-Mar-19	10	3.0	2.0	< 1.0	7.0	23	< 0.1	-	-	-	-	-	-	-	-	0.75	0.79	-
	23-Apr-19	14	2.0	2.0	< 1.0	6.0	23	< 0.1	-	-	-	-	-	-	-	-	0.87	0.77	-
	16-May-19	12	2.0	2.0	< 1.0	21	22	< 0.1	< 0.01	0.26	< 0.01	0.38	0.38	0.01	1.3	0.9	0.79	1.06	-
	14-Jun-19	11	1.0	2.0	< 1.0	5.0	23	< 0.1	-	-	-	-	-	-	-	-	0.69	0.75	-
	16-Jul-19	13	2.0	2.0	< 1.0	9.0	20	< 0.1	-	-	-	-	-	-	-	-	0.83	0.75	-
	15-Aug-19	12	1.0	2.0	< 1.0	8.0	20	< 0.1	-	-	-	-	-	-	-	-	0.74	0.73	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	18	< 0.1	< 0.01	0.28	< 0.01	1.07	1.07	0.04	2.7	1.6	0.74	0.67	-
	15-Oct-19	12	2.0	2.0	< 1.0	5.0	20	< 0.1	-	-	-	-	-	-	-	-	0.79	0.67	-
	18-Nov-19	14	2.0	1.0	< 1.0	7.0	19	< 0.1	< 0.01	0.21	< 0.01	1.01	1.01	0.05	2.1	1.1	0.79	0.68	-
	17-Dec-19	13	2	2	<1	8	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.69	-
	16-Jan-20	13	2	2	<1	6	17	<0.1	-	-	-	-	-	-	-	-	0.83	0.72	-
BH3	21-Feb-19	4.0	4.0	1.0	< 1.0	4.0	10	< 0.1	< 0.01	2.76	< 0.01	0.78	0.78	0.3	5.9	5.1	0.46	0.54	-
BH4	21-Feb-19	8.0	2.0	1.0	1.0	5.0	17	< 0.1	< 0.01	0.19	< 0.01	0.35	0.35	0.04	0.6	0.3	0.56	0.7	-
	15-Mar-19	9.0	2.0	< 1.0	< 1.0	5.0	18	< 0.1	-	-	-	-	-	-	-	-	0.49	0.61	-
	23-Apr-19	10	2.0	1.0	1.0	3.0	19	< 0.1	-	-	-	-	-	-	-	-	0.64	0.6	-
	16-May-19	9.0	2.0	1.0	1.0	22	19	< 0.1	< 0.01	0.97	< 0.01	0.29	0.29	< 0.01	1.0	0.7	0.6	0.99	-
	14-Jun-19	6.0	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.39	0.59	-
	16-Jul-19	10	2.0	2.0	1.0	6.0	18	< 0.1	-	-	-	-	-	-	-	-	0.72	0.63	-
	15-Aug-19	8.0	2.0	1.0	1.0	5.0	16	< 0.1	-	-	-	-	-	-	-	-	0.56	0.56	-
	16-Sep-19	11	2.0	2.0	< 1.0	8.0	19	< 0.1	< 0.01	0.4	< 0.01	0.24	0.24	0.02	0.6	0.4	0.74	0.7	-
	15-Oct-19	10	1.0	1.0	< 1.0	4.0	18	< 0.1	-	-	-	-	-	-	-	-	0.57	0.59	-
	18-Nov-19	11	1.0	1.0	< 1.0	6.0	18	< 0.1	< 0.01	0.08	< 0.01	0.29	0.29	< 0.01	0.3	< 0.1	0.61	0.63	-
	17-Dec-19	9	1	1	1	6	16	<0.1	-	-	-	-	-	-	-	-	0.55	0.64	-
	16-Jan-20	13	2	2	2	6	18	<0.1	-	-	-	-	-	-	-	-	0.88	0.71	-
BH5	22-Feb-19	42	< 1.0	6.0	1.0	19	69	0.2	< 0.01	0.34	< 0.01	< 0.01	< 0.01	0.09	3.0	3.0	2.35	2.34	-
BH6	22-Feb-19	28	3.0	4.0	1.0	28	42	< 0.1	< 0.01	0.05	< 0.01	0.09	0.09	0.14	0.5	0.4	1.72	1.77	-
	14-Mar-19	23	2.0	4.0	1.0	17	37	< 0.1	-	-	-	-	-	-	-	-	1.46	1.44	-
	23-Apr-19	25	3.0	4.0	1.0	18	42	< 0.1	-	-	-	-	-	-	-	-	1.59	1.56	-
	16-May-19	23	3.0	4.0	1.0	18	45	< 0.1	< 0.01	0.13	< 0.01	< 0.01	< 0.01	0.14	0.6	0.6	1.5	1.64	-
	14-Jun-19	20	2.0	4.0	1.0	16	42	< 0.1	-	-	-	-	-	-	-	-	1.32	1.52	-
	16-Jul-19	23	2.0	4.0	1.0	20	35	< 0.1	-	-	-	-	-	-	-	-	1.46	1.4	-
	15-Aug-19	23	2.0	3.0	1.0	21	38	< 0.1	-	-	-	-	-	-	-	-	1.37	1.51	-
	16-Sep-19	25	3.0	3.0	1.0	21	38	< 0.1	< 0.01	0.15	< 0.01	0.07	0.07	0.19	0.8	0.7	1.51	1.55	-
	15-Oct-19	25	2.0	4.0	1.0	13	41	< 0.1	-	-	-	-	-	-	-	-	1.54	1.43	-
	18-Nov-19	27	3.0	3.0	1.0	18	45	< 0.1	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.23	0.4	0.4	1.6	1.64	-
	17-Dec-19	26	2	4	1	16	42	<0.1	-	-	-	-	-	-	-	-	1.58	1.62	-
	16-Jan-20	30	3	4	2	15	50	0.2	-	-	-	-	-	-	-	-	1.83	1.86	-
BH7	22-Feb-19	34	< 1.0	5.0	2.0	12	64	0.2	< 0.01	0.13	< 0.01	0.02	0.02	0.34	2.2	2.2	1.94	2.06	-
	14-Mar-19	36	< 1.0	6.0	2.0	16	61	< 0.1	-	-	-	-	-	-	-	-	2.11	2.05	1.37
	23-Apr-19	38	< 1.0	6.0	2.0	17	62	< 0.1	-	-	-	-	-	-	-	-	2.2	2.1	-
	16-May-19	35	< 1.0	5.0	2.0	15	68	0.2	< 0.01	0.06	< 0.01	< 0.01	< 0.01	0.27	0.9	0.9	1.98	2.23	-
	14-Jun-19	31	< 1.0	4.0	2.0	11	56	0.1	-	-	-	-	-	-	-	-	1.73	1.81	-
	16-Jul-19	36	< 1.0	5.0	2.0	12	46	< 0.1	-	-	-	-	-	-	-	-	2.03	1.55	-
	15-Aug-19	32	< 1.0	4.0	2.0	15	49	0.1	-	-	-	-	-	-	-	-	1.77	1.85	-
	16-Sep-19	27	< 1.0	4.0	1.0	13	53	< 0.1	< 0.01	0.09	< 0.01	0.06	0.06	0.2	1.2	1.1	1.53	1.86	-
	15-Oct-19	34	< 1.0	5.0	2.0	12	53	< 0.1	-	-	-	-	-	-	-	-	1.94	1.74	-
	18-Nov-19	31	< 1.0	5.0	1.0	15	56	0.1	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.17	0.5	0.5	1.78	1.89	-
	17-Dec-19	26	<1	5	1	15	44	<0.1	-	-	-	-	-	-	-	-	1.57	1.59	-
	16-Jan-20	27	<1	4	1	13	46	0.2	-	-	-	-	-	-	-	-	1.53	1.63	-

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

	Alkalinity						Inorganics		
Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
0.01	1	1	1	1	1	1	1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						125-2200			6.5 - 8.0*
					200[3]		600[3]		6.5-8.5[3]
-	**9.0**	< 1.0	< 1.0	**9.0**	**9.0**	**104**	**68**	**129**	**5.67**
-	**10**	< 1.0	< 1.0	**10**	**11**	**84**	**55**	**97**	**5.83**
1.7	**10**	< 1.0	< 1.0	**10**	**8.0**	**105**	**68**	**164**	**5.82**
-	**10**	< 1.0	< 1.0	**10**	**8.0**	**99**	**64**	**72**	**5.52**
-	**11**	< 1.0	< 1.0	**11**	**8.0**	**102**	**66**	**84**	**5.62**
-	**14**	< 1.0	< 1.0	**14**	**8.0**	**128**	**83**	**82**	**6.22**
1.84	**8.0**	< 1.0	< 1.0	**8.0**	**8.0**	**102**	**66**	**88**	**5.44**
-	**4.0**	< 1.0	< 1.0	**4.0**	**8.0**	**98**	**64**	-	**5.5**
2.26	**24**	< 1.0	< 1.0	**24**	**8.0**	**126**	**82**	-	**6.29**
-	**15**	<1	<1	**15**	**8**	**118**	**77**	-	**6.05**
-	**22**	<1	<1	**22**	**12**	**112**	**73**	-	**6.23**
3.21	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**346**	**278**	-	**4.67**
-	< 1.0	< 1.0	< 1.0	< 1.0	**8.0**	**186**	**121**	**144**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**150**	**98**	**135**	**4.99**
3.0	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**188**	**122**	**216**	**4.91**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**175**	**114**	**107**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**318**	**207**	**192**	**4.68**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**197**	**128**	**135**	**4.88**
3.18	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**195**	**127**	**140**	**4.66**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**194**	**126**	-	**4.92**
3.3	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**193**	**125**	-	**5.12**
-	**2**	<1	<1	**2**	**16**	**196**	**127**	-	**5.03**
-	**2**	<1	<1	**2**	**12**	**168**	**109**	-	**5.09**
1.44	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**91**	**128**	-	**4.87**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**101**	**66**	**90**	**4.71**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**70**	**46**	**84**	**4.82**
1.44	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**94**	**61**	**144**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**91**	**59**	**51**	**4.76**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**90**	**58**	**63**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**11**	**110**	**72**	**61**	**5.2**
1.32	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**96**	**62**	**60**	**4.72**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**102**	**66**	-	**5.06**
2.02	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**102**	**66**	-	**5.47**
-	**2**	<1	<1	**2**	**13**	**106**	**69**	-	**5.43**
-	**6**	<1	<1	**6**	**13**	**102**	**66**	-	**5.61**
0.46	**9.0**	< 1.0	< 1.0	**9.0**	**14**	**60**	**438**	-	**5.55**
1.15	**6.0**	< 1.0	< 1.0	**6.0**	**9.0**	**73**	**96**	-	**5.4**
-	< 1.0	< 1.0	< 1.0	< 1.0	**5.0**	**77**	**50**	**70**	**5.12**
-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**54**	**35**	**61**	**5.05**
1.3	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**73**	**47**	**100**	**4.99**
-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**69**	**45**	**36**	**4.84**
-	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**75**	**49**	**42**	**4.96**
-	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	**85**	**55**	**49**	**5.01**
1.32	< 1.0	< 1.0	< 1.0	< 1.0	**13**	**95**	**62**	**58**	**4.83**
-	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**85**	**55**	-	**4.93**
1.86	< 1.0	< 1.0	< 1.0	< 1.0	**7.0**	**86**	**56**	-	**5.34**
-	**3**	<1	<1	**3**	**7**	**85**	**55**	-	**5.44**
-	**4**	<1	<1	**4**	**13**	**85**	**55**	-	**5.5**
3.59	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**250**	**211**	-	**4.87**
2.49	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**177**	**144**	-	**4.37**
-	**2.0**	< 1.0	< 1.0	**2.0**	**21**	**179**	**116**	**146**	**4.95**
-	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**136**	**88**	**115**	**4.64**
2.04	< 1.0	< 1.0	< 1.0	< 1.0	**24**	**175**	**114**	**214**	**4.88**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**174**	**113**	**90**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**161**	**105**	**82**	**4.73**
-	< 1.0	< 1.0	< 1.0	< 1.0	**17**	**201**	**131**	**104**	**4.87**
2.44	**2.0**	< 1.0	< 1.0	**2.0**	**20**	**197**	**128**	**124**	**4.68**
-	< 1.0	< 1.0	< 1.0	< 1.0	**21**	**202**	**131**	-	**5.17**
2.64	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**204**	**133**	-	**5.32**
-	**5**	<1	<1	5	**21**	**207**	**134**	-	**5.58**
-	**7**	<1	<1	7	**24**	**218**	**142**	-	**5.51**
3.16	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**213**	**196**	-	**4.76**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**271**	**176**	**212**	**4.73**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**205**	**133**	**185**	**4.51**
3.26	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**235**	**153**	**310**	**4.87**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**213**	**138**	**145**	**4.91**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**202**	**131**	**164**	**5.0**
-	**8.0**	< 1.0	< 1.0	**8.0**	**16**	**232**	**151**	**168**	**5.53**
2.79	**5.0**	< 1.0	< 1.0	**5.0**	**16**	**222**	**144**	**181**	**5.07**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**252**	**164**	-	**4.95**
2.89	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**239**	**155**	-	**4.97**
-	**2.0**	<1	<1	**2.0**	**20**	**210**	**136**	-	**5.14**
-	**3**	<1	<1	**3**	**16**	**202**	**131**	-	**5.27**

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

Analyte		Anions and Cations																	
		Sodium	Calcium	Magnesium	Potassium	Sulphate	Chloride	Fluoride	Reactive phosphorus as P	Total Phosphorus	Nitrite as N	Nitrate as N	Nitrite + Nitrate as N	Ammonia as N	Total Nitrogen as N	Total Kjeldahl Nitrogen as N	Total Cations	Total Anions	Ionic Balance
LOR		1	1	1	1	1	1	0.1	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.1	0.01	0.01	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
ANZECC 2000 Trigger Values									0.02*	0.025*		0.7**		0.9**	0.35*				
NHMRC ADWG 6		180[3]				250[3]	250[3]	1.5			3	50		0.5[3]					
BH8	21-Feb-19	**52**	< 1.0	**6.0**	< 1.0	**11**	**90**	< 0.1	< 0.01	**1.97**	< 0.01	< 0.01	< 0.01	**0.5**	**2.4**	**2.4**	**2.76**	**2.77**	-
	14-Mar-19	**45**	< 1.0	**6.0**	< 1.0	**6.0**	**76**	< 0.1	-	-	-	-	-	-	-	-	**2.45**	**2.27**	-
	23-Apr-19	**53**	< 1.0	**7.0**	< 1.0	**8.0**	**89**	< 0.1	-	-	-	-	-	-	-	-	**2.88**	**2.68**	-
	16-May-19	**47**	< 1.0	**4.0**	< 1.0	**6.0**	**81**	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.12**	**0.4**	**0.4**	**2.37**	**2.43**	-
	14-Jun-19	**47**	< 1.0	**5.0**	< 1.0	**4.0**	**89**	< 0.1	-	-	-	-	-	-	-	-	**2.46**	**2.59**	-
	16-Jul-19	**57**	< 1.0	**5.0**	< 1.0	**70**	**121**	**0.1**	-	-	-	-	-	-	-	-	**2.89**	**4.87**	**26**
	15-Aug-19	**42**	< 1.0	**3.0**	< 1.0	**4.0**	**63**	< 0.1	-	-	-	-	-	-	-	-	**2.07**	**1.86**	-
	16-Sep-19	**46**	< 1.0	**3.0**	< 1.0	**4.0**	**70**	< 0.1	< 0.01	**0.43**	< 0.01	< 0.01	< 0.01	**0.13**	**1.1**	**1.1**	**2.25**	**2.06**	-
	15-Oct-19	**45**	< 1.0	**4.0**	< 1.0	**4.0**	**70**	< 0.1	-	-	-	-	-	-	-	-	**2.29**	**2.06**	-
	18-Nov-19	**49**	< 1.0	**4.0**	< 1.0	**8.0**	**80**	< 0.1	< 0.01	**0.58**	< 0.01	**0.01**	**0.01**	**0.17**	**1.3**	**1.3**	**2.46**	**2.42**	-
	17-Dec-19	**50**	<1	**4**	<1	**10**	**75**	<0.1	-	-	-	-	-	-	-	-	**2.5**	**2.36**	-
	16-Jan-20	**49**	<1	**4**	<1	**13**	**78**	<0.1	-	-	-	-	-	-	-	-	**2.46**	**6.61**	-
MW239S	22-Feb-19	**61**	< 1.0	**6.0**	< 1.0	**6.0**	**104**	< 0.1	< 0.01	**0.56**	< 0.01	< 0.01	< 0.01	**0.18**	**3.9**	**3.9**	**3.15**	**3.06**	**1.43**
	14-Mar-19	**64**	< 1.0	**6.0**	< 1.0	**2.0**	**126**	< 0.1	-	-	-	-	-	-	-	-	**3.28**	**3.64**	**5.18**
	23-Apr-19	**64**	< 1.0	**7.0**	**1.0**	**9.0**	**97**	< 0.1	-	-	-	-	-	-	-	-	**3.38**	**2.92**	**7.32**
	16-May-19	**52**	< 1.0	**6.0**	< 1.0	**13**	**88**	< 0.1	< 0.01	**0.43**	< 0.01	< 0.01	< 0.01	**0.09**	**1.7**	**1.7**	**2.76**	**2.75**	-
	14-Jun-19	**50**	< 1.0	**6.0**	< 1.0	**13**	**87**	< 0.1	-	-	-	-	-	-	-	-	**2.67**	**2.86**	-
	16-Jul-19	**52**	< 1.0	**7.0**	**1.0**	**16**	**73**	< 0.1	-	-	-	-	-	-	-	-	**2.86**	**2.39**	-
	15-Aug-19	**54**	< 1.0	**7.0**	< 1.0	**11**	**88**	< 0.1	-	-	-	-	-	-	-	-	**2.92**	**2.71**	-
	16-Sep-19	**55**	< 1.0	**6.0**	**1.0**	**14**	**85**	< 0.1	< 0.01	**0.32**	< 0.01	< 0.01	< 0.01	**0.1**	**1.4**	**1.4**	**2.91**	**2.69**	-
	15-Oct-19	**58**	< 1.0	**6.0**	< 1.0	**8.0**	**108**	< 0.1	-	-	-	-	-	-	-	-	**3.02**	**3.21**	**3.15**
	18-Nov-19	**63**	< 1.0	**6.0**	**1.0**	**8.0**	**118**	< 0.1	< 0.01	**0.23**	< 0.01	< 0.01	< 0.01	**0.17**	**1.2**	**1.2**	**3.26**	**3.5**	**3.48**
	17-Dec-19	**65**	<1	**8**	<1	**6**	**127**	<0.1	-	-	-	-	-	-	-	-	**3.48**	**3.75**	**3.62**
	16-Jan-20	**67**	<1	**8**	<1	**7**	**120**	<0.1	-	-	-	-	-	-	-	-	**3.57**	**3.57**	**0.03**
SW1	23-Apr-19	**94**	**34**	**52**	**6.0**	**310**	**95**	**0.5**	-	-	-	-	-	-	-	-	**10**	**9.13**	**5.6**
	16-May-19	**86**	**24**	**42**	**6.0**	**324**	**112**	**0.3**	< 0.01	**0.13**	< 0.01	< 0.01	< 0.01	< 0.01	**1.8**	**1.8**	**8.94**	**9.9**	**5.13**
	14-Jun-19	**77**	**20**	**34**	**5.0**	**182**	**112**	**0.4**	-	-	-	-	-	-	-	-	**7.27**	**6.95**	**2.28**
	16-Jul-19	**90**	**20**	**35**	**4.0**	**240**	**130**	**0.4**	-	-	-	-	-	-	-	-	**7.9**	**8.66**	**4.64**
	15-Aug-19	**97**	**18**	**32**	**4.0**	**212**	**134**	**0.4**	-	-	-	-	-	-	-	-	**7.85**	**8.19**	**2.12**
	16-Sep-19	**117**	**21**	**39**	**4.0**	**244**	**193**	**0.7**	< 0.01	**0.05**	< 0.01	**0.02**	**0.02**	< 0.01	**1.2**	**1.2**	**9.45**	**11**	**5.38**
	15-Oct-19	**124**	**16**	**31**	**3.0**	**127**	**191**	**0.6**	-	-	-	-	-	-	-	-	**8.82**	**8.03**	**4.68**
	18-Nov-19	**142**	**14**	**30**	**4.0**	**165**	**234**	**0.5**	< 0.01	**0.02**	< 0.01	< 0.01	< 0.01	**0.03**	**1.1**	**1.1**	**9.45**	**10**	**3.03**
SW3	22-Feb-19	**40**	**4.0**	**4.0**	**1.0**	**16**	**82**	< 0.1	< 0.01	**0.06**	< 0.01	< 0.01	< 0.01	**0.16**	**1.0**	**1.0**	**2.55**	**2.87**	-
	14-Mar-19	**45**	**6.0**	**6.0**	**2.0**	**44**	**64**	< 0.1	-	-	-	-	-	-	-	-	**2.8**	**2.8**	-
	23-Apr-19	**37**	**8.0**	**6.0**	**1.0**	**42**	**53**	< 0.1	-	-	-	-	-	-	-	-	**2.53**	**2.37**	-
	16-May-19	**35**	**7.0**	**5.0**	< 1.0	**34**	**54**	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.1**	**0.1**	**2.28**	**2.25**	-
	14-Jun-19	**32**	**7.0**	**6.0**	< 1.0	**41**	**55**	< 0.1	-	-	-	-	-	-	-	-	**2.24**	**2.4**	-
	16-Jul-19	**46**	**8.0**	**12**	< 1.0	**104**	**57**	**0.2**	-	-	-	-	-	-	-	-	**3.39**	**3.77**	**5.38**
	15-Aug-19	**38**	**6.0**	**7.0**	< 1.0	**54**	**56**	**0.1**	-	-	-	-	-	-	-	-	**2.53**	**2.7**	-
	16-Sep-19	**42**	**7.0**	**8.0**	< 1.0	**48**	**57**	**0.1**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.01**	**0.1**	**0.1**	**2.83**	**2.61**	-
	15-Oct-19	**40**	**5.0**	**7.0**	< 1.0	**42**	**57**	**0.2**	-	-	-	-	-	-	-	-	**2.56**	**2.48**	-
	18-Nov-19	**36**	**5.0**	**5.0**	< 1.0	**29**	**56**	< 0.1	< 0.01	**0.04**	< 0.01	**0.01**	**0.01**	**0.03**	**0.6**	**0.6**	**2.23**	**2.18**	-
	17-Dec-19	**40**	**4**	**7**	**1**	**25**	**57**	<0.1	-	-	-	-	-	-	-	-	**2.54**	**2.25**	
SW4	23-Apr-19	**39**	**5.0**	**5.0**	< 1.0	**60**	**64**	**0.1**	-	-	-	-	-	-	-	-	**2.36**	**3.05**	**13**
	16-May-19	**41**	**5.0**	**5.0**	< 1.0	**41**	**59**	< 0.1	**0.01**	< 0.01	< 0.01	**0.05**	**0.05**	< 0.01	**0.2**	**0.2**	**2.44**	**2.52**	-
	14-Jun-19	**40**	**5.0**	**5.0**	< 1.0	**39**	**60**	< 0.1	-	-	-	-	-	-	-	-	**2.4**	**2.5**	-
	16-Jul-19	**46**	**7.0**	**7.0**	< 1.0	**67**	**56**	**0.2**	-	-	-	-	-	-	-	-	**2.93**	**2.97**	-
	15-Aug-19	**40**	**5.0**	**5.0**	< 1.0	**43**	**55**	**0.1**	-	-	-	-	-	-	-	-	**2.4**	**2.45**	-
	16-Sep-19	**45**	**7.0**	**6.0**	< 1.0	**45**	**58**	**0.1**	< 0.01	**0.01**	< 0.01	< 0.01	< 0.01	< 0.01	**0.1**	**0.1**	**2.8**	**2.57**	-
	15-Oct-19	**44**	**6.0**	**6.0**	< 1.0	**38**	**57**	**0.1**	-	-	-	-	-	-	-	-	**2.71**	**2.4**	-
	18-Nov-19	**41**	**4.0**	**5.0**	< 1.0	**41**	**64**	**0.2**	< 0.01	< 0.01	< 0.01	**0.02**	**0.02**	< 0.01	**0.2**	**0.2**	**2.76**	**2.66**	-

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
LOR - Laboratory limit of reporting
mg/L - Milligrams per litre
µS/cm - Microsiemens per centimeter
Bold indicates a detection above the laboratory limit of reporting

* Default trigger values for physical and chemical stressors, for slightly disturbed ecosystems in lowland rivers, Southeast Australia (value is for base flow and not storm event)
** 95% Level of protection in freshwater
[3] Aesthetic

Table 4
Groundwater Analytical Data - Inorganics
Williamtown Sand Syndicate

	Alkalinity						Inorganics		
Sodium Adsorption Ratio	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Total Hardness as CaCO3	Electrical Conductivity @ 25°C*	Total Dissolved Solids	Total Dissolved Solids	pH
0.01	1	1	1	1	1	1	1	10	0.01
-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	pH units
						125-2200			6.5 - 8.0*
					200[3]		600[3]		6.5-8.5[3]
4.44	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**352**	**258**	-	**4.46**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**319**	**207**	**253**	**4.77**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**264**	**172**	**223**	**4.76**
4.86	**1.0**	< 1.0	< 1.0	**1.0**	**16**	**302**	**196**	**354**	**4.9**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**315**	**205**	**194**	**4.82**
-	< 1.0	< 1.0	< 1.0	< 1.0	**20**	**353**	**229**	**226**	**4.78**
-	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**260**	**169**	**140**	**5.0**
5.43	< 1.0	< 1.0	< 1.0	< 1.0	**12**	**293**	**190**	**206**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**303**	**197**	-	**5.02**
5.06	< 1.0	< 1.0	< 1.0	< 1.0	**16**	**316**	**205**	-	**5.12**
-	**2**	<1	<1	**2**	**16**	**328**	**213**	-	**5.02**
-	**7**	<1	<1	**7**	**16**	**318**	**207**	-	**5.55**
5.21	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**329**	**234**	-	**4.89**
-	**2.0**	< 1.0	< 1.0	**2.0**	**25**	**410**	**266**	**232**	**5.02**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**294**	**191**	**208**	**4.92**
4.44	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**327**	**212**	**320**	**4.87**
-	**7.0**	< 1.0	< 1.0	**7.0**	**25**	**334**	**217**	**220**	**5.39**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**353**	**229**	**188**	**4.85**
-	< 1.0	< 1.0	< 1.0	< 1.0	**29**	**359**	**233**	**195**	**4.83**
4.7	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**373**	**242**	**224**	**4.66**
-	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**404**	**263**	-	**4.86**
5.38	< 1.0	< 1.0	< 1.0	< 1.0	**25**	**419**	**272**	-	**4.76**
-	**2**	<1	<1	**2**	**33**	**439**	**285**	-	**5.01**
-	**2**	<1	<1	**2**	**33**	**423**	**275**	-	**5.02**
-	< 1.0	< 1.0	< 1.0	< 1.0	**299**	**893**	**580**	**707**	**4.01**
2.45	< 1.0	< 1.0	< 1.0	< 1.0	**233**	**947**	**616**	**715**	**4.6**
-	< 1.0	< 1.0	< 1.0	< 1.0	**190**	**847**	**550**	**512**	**4.5**
-	< 1.0	< 1.0	< 1.0	< 1.0	**194**	**876**	**569**	**568**	**4.42**
-	< 1.0	< 1.0	< 1.0	< 1.0	**177**	**813**	**528**	**548**	**4.53**
3.49	< 1.0	< 1.0	< 1.0	< 1.0	**213**	**1,080**	**702**	**689**	**4.32**
-	< 1.0	< 1.0	< 1.0	< 1.0	**168**	**1,050**	**682**	-	**5.32**
4.91	< 1.0	< 1.0	< 1.0	< 1.0	**158**	**1,090**	**708**	-	**5.06**
3.38	**11**	< 1.0	< 1.0	**11**	**26**	**262**	**228**	-	**6.21**
-	**4.0**	< 1.0	< 1.0	**4.0**	**40**	**344**	**224**	**279**	**5.42**
-	< 1.0	< 1.0	< 1.0	< 1.0	**45**	**220**	**143**	**190**	**5.2**
2.47	**1.0**	< 1.0	< 1.0	**1.0**	**38**	**271**	**176**	**300**	**5.24**
-	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**300**	**195**	**170**	**4.58**
-	< 1.0	< 1.0	< 1.0	< 1.0	**69**	**451**	**293**	**246**	**4.47**
-	< 1.0	< 1.0	< 1.0	< 1.0	**44**	**338**	**220**	**192**	**4.47**
2.57	< 1.0	< 1.0	< 1.0	< 1.0	**50**	**374**	**243**	**201**	**4.3**
-	< 1.0	< 1.0	< 1.0	< 1.0	**41**	**383**	**249**	-	**4.75**
2.72	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**278**	**181**	-	**5.39**
	6	<1	<1	**6**	**39**	**301**	**196**		**5.75**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**293**	**190**	**198**	**4.0**
3.1	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**331**	**215**	**288**	**4.08**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**316**	**205**	**163**	**4.31**
-	< 1.0	< 1.0	< 1.0	< 1.0	**46**	**367**	**238**	**207**	**4.46**
-	< 1.0	< 1.0	< 1.0	< 1.0	**33**	**308**	**200**	**160**	**4.48**
3.01	< 1.0	< 1.0	< 1.0	< 1.0	**42**	**360**	**234**	**208**	**4.35**
-	< 1.0	< 1.0	< 1.0	< 1.0	**40**	**365**	**237**	-	**4.48**
3.22	< 1.0	< 1.0	< 1.0	< 1.0	**30**	**348**	**226**	-	**4.48**

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

Analyte			BTEXN								Total Petroleum Hydrocarbons					Total Petroleum Hydrocar	
			Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	Sum of BTEX	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_{10}-C_{14} - Silica Cleanup	C_{15}-C_{28} - Silica Cleanup
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sample Name	Sample Date	Sample Type															
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE01_21022019	21-Feb-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP01_21022019	21-Feb-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH8_21022019	21-Feb-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP01_21022019	21-Feb-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE02_140319	14-Mar-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH7_140319	14-Mar-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP02_140319	14-Mar-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_03	23-Apr-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE_03	23-Apr-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK_04	16-May-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	-	-
RINSATE_04	16-May-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 05_14062019	14-Jun-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP05_14062019	14-Jun-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW3_14062019	14-Jun-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP05_140619	14-Jun-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE06_16072019	16-Jul-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE07	15-Aug-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	< 50	< 100	< 50	< 50	-	-
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 08_16092019	16-Sep-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP08_16092019	16-Sep-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_16092019	16-Sep-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP08_16092019	16-Sep-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	200	400	200	800	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE_15102019	15-Oct-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE09_181119	18-Nov-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
DUP09_181119	18-Nov-19	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
TRIP09_18112019	18-Nov-19	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	< 50	< 100	< 100	< 100	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE10_171219	17-Dec-19	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RIP BLANK 13_20013330(	16-Jan-20	Trip Blank	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
BH6_2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW12_2001333012	16-Jan-20	Duplicate	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 1.0	< 20	-	-	-	-	< 50	< 100
QW13_14392	16-Jan-20	Triplicate	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 3.0	< 10	-	< 20	250	300	100	650	< 50	< 100
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre
BTEXN - Benzene, toluene, ethylbenzene, xylenes, naphthalene

Table 5
Quality Control Sample Analysis - BTEXN
Williamtown Sand Syndicate

bons - Silcia Clean up		Total Recoverable Hydrocarbons						Total Recoverable Hydrocarbons - Silcia Clean up				
C_{29}-C_{36} - Silica Cleanup	C_{10}-C_{36} Sum - Silica Cleanup	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	$>C_{10}$ - C_{16}	$>C_{10}$ - C_{16} minus Naphthalene (F2)	$>C_{16}$ - C_{34}	$>C_{34}$ - C_{40}	$>C_{10}$-C_{16} - Silica Cleanup	F2 - Silica Cleanup	$>C_{16}$-C_{34} - Silica Cleanup	$>C_{34}$-C_{40} - Silica Cleanup	$>C_{10}$-C_{40} - Silica Cleanup
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC					NC	NC	NC	NC	NC
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20					-	-	-	-	-
< 50	< 50	< 20	< 20					< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	-	-	-	-	< 50	< 50	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
-	-	< 20	< 20	< 100	< 100	< 100	< 100	-	-	-	-	-
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	180	180	400	100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 100	< 20	< 20	< 50	< 50	< 100	< 100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 50	< 50	< 20	< 20	-	-	-	-	< 100	< 100	< 100	< 100	< 100
< 100	< 400	< 20	< 20	210	210	400	<100	< 50	-	< 100	< 100	-
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 6
Quality Control Sample Analysis - Metals
Williamtown Sand Syndicate

Analyte			Metals														
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Vanadium	Zinc
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date	Sample Type																
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
DUP01_21022019	21-Feb-19	Duplicate	0.001	0.014	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.09	< 0.001	0.012	< 0.0001	0.003	< 0.01	< 0.01	0.015
Relative Percentage Difference			**67%**	24%	NC	NC	NC	0%	NC	NC	0%	NC	0%	NC	40%	NC	NC	**100%**
BH8_21022019	21-Feb-19	Primary	< 0.001	0.011	< 0.001	< 0.05	< 0.0001	0.001	< 0.001	< 0.001	4.1	< 0.001	0.012	< 0.0001	0.002	< 0.01	< 0.01	0.005
TRIP01_21022019	21-Feb-19	Triplicate	0.001	< 0.02	< 0.001	< 0.05	< 0.0002	< 0.005	< 0.001	< 0.001	4.5	< 0.001	0.012	< 0.0001	0.003	-	< 0.005	0.006
Relative Percentage Difference			**67%**	10%	NC	NC	NC	**86%**	NC	NC	9%	NC	0%	NC	40%	NC	NC	18%
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.001	**0.002**	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE02_140319	14-Mar-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
DUP02_140319	14-Mar-19	Duplicate	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.002	< 0.001	2.51	< 0.001	0.021	< 0.0001	0.004	< 0.01	< 0.01	0.007
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	**40%**	NC	33%	NC	5%	NC	0%	NC	NC	25%
BH7_140319	14-Mar-19	Primary	< 0.001	0.01	< 0.001	< 0.05	< 0.0001	0.001	0.003	< 0.001	1.8	< 0.001	0.02	< 0.0001	0.004	< 0.01	< 0.01	0.009
TRIP02_14032019	14-Mar-19	Triplicate	< 0.001	< 0.02	< 0.001	< 0.05	< 0.0002	0.001	0.002	< 0.001	1.7	< 0.001	0.019	< 0.0001	< 0.001	-	< 0.005	< 0.005
Relative Percentage Difference			NC	0%	NC	NC	NC	0%	**40%**	NC	6%	NC	5%	NC	**156%**	NC	NC	**113%**
TRIP BLANK_03	23-Apr-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_03	23-Apr-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK_04	16-May-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_04	16-May-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
DUP05_14062019	14-Jun-19	Duplicate	< 0.001	0.036	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.63	< 0.001	0.039	< 0.0001	0.003	< 0.01	< 0.01	0.013
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	0%	NC	3%	NC	3%	NC	0%	NC	NC	21%
SW3_14062019	14-Jun-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	0.003	< 0.001	1.68	< 0.001	0.038	< 0.0001	0.003	< 0.01	< 0.01	0.016
TRIP05_140619	14-Jun-19	Triplicate	< 0.001	-	-	-	< 0.0002	0.001	-	< 0.001	1.6	< 0.001	-	< 0.0001	0.003	-	-	0.01
Relative Percentage Difference			NC	NC	NC	NC	NC	**67%**	NC	NC	5%	NC	NC	NC	0%	NC	NC	46%
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE07	15-Aug-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
DUP08_16092019	16-Sep-19	Duplicate	< 0.001	0.041	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	< 0.001	0.76	< 0.001	0.036	< 0.0001	0.003	< 0.01	< 0.01	0.012
Relative Percentage Difference			NC	11%	NC	NC	NC	NC	0%	**190%**	8%	**67%**	8%	NC	**140%**	NC	NC	**151%**
SW4_16092019	16-Sep-19	Primary	< 0.001	0.046	< 0.001	< 0.05	< 0.0001	< 0.001	0.002	0.02	0.7	0.001	0.039	< 0.0001	0.017	< 0.01	< 0.01	0.085
TRIP08_16092019	16-Sep-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	0.002	< 0.001	0.69	< 0.001	0.037	< 0.0001	0.003	-	< 0.005	0.012
Relative Percentage Difference			NC	14%	NC	NC	NC	NC	0%	**190%**	1%	**67%**	5%	NC	**140%**	NC	NC	**151%**
TRIP BLANK_15102019	15-Oct-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE_15102019	15-Oct-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE09_181119	18-Nov-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
DUP09_181119	18-Nov-19	Duplicate	< 0.001	0.034	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	5.9	< 0.001	0.036	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
Relative Percentage Difference			NC	3%	NC	NC	NC	NC	NC	NC	7%	NC	12%	NC	0%	NC	NC	NC
SW4_181119	18-Nov-19	Primary	< 0.001	0.035	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	0.001	6.32	< 0.001	0.032	< 0.0001	0.002	< 0.01	< 0.01	< 0.005
TRIP09_18112019	18-Nov-19	Triplicate	< 0.001	0.04	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.001	0.01	-	< 0.001	0.035	< 0.0001	0.007	-	< 0.005	0.033
Relative Percentage Difference			NC	13%	NC	NC	NC	NC	NC	2%	NC	NC	9%	NC	**111%**	NC	NC	**172%**
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE10_171219	17-Dec-19	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RIP BLANK 13_200133300	16-Jan-20	Trip Blank	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 0.001	< 0.001	< 0.001	< 0.05	< 0.0001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.001	< 0.001	< 0.0001	< 0.001	< 0.01	< 0.01	< 0.005
BH6_2001333004	16-Jan-20	Primary	<0.001	0.032	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.15	<0.001	0.01	<0.0001	<0.001	<0.01	<0.01	<0.005
QW12_2001333012	16-Jan-20	Duplicate	<0.001	0.035	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.18	<0.001	0.009	<0.0001	0.001	<0.01	<0.01	<0.005
Relative Percentage Difference			NC	9%	NC	NC	NC	NC	NC	NC	1%	NC	11%	NC	**67%**	NC	NC	NC
BH6_2001333004	16-Jan-20	Primary	<0.001	0.032	<0.001	<0.05	<0.0001	<0.001	<0.001	<0.001	2.15	<0.001	0.01	<0.0001	<0.001	<0.01	<0.01	<0.005
QW13_14392	16-Jan-20	Triplicate	< 0.001	0.03	< 0.001	< 0.05	< 0.0002	< 0.001	< 0.001	0.004	1.6	< 0.001	0.009	< 0.0001	< 0.001	-	< 0.005	0.012
Relative Percentage Difference			NC	6%	NC	NC	NC	NC	NC	**156%**	29%	NC	11%	NC	NC	NC	NC	**131%**

Notes:
- - Not analysed
< - Less than laboratory limit of reporting
NC - Not calculated
mg/L - Milligrams per litre
Half the laboratory limit of reporting used when calculating RPD
RPD - Relative Percentage Difference

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

Analyte			Perfluoroalkyl Sulfonic Acids											Perf
			Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonate (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	
Units			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Sample Name	Sample Date	Sample Type												
TRIP BLANK_13022019	13-Feb-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE01_21022019	21-Feb-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
DUP01_21022019	21-Feb-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
BH8_21022019	21-Feb-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP01_21022019	21-Feb-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
TRIP BLANK_130319	13-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK02_150319	15-Mar-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE02_140319	14-Mar-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
DUP02_140319	14-Mar-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
BH7_140319	14-Mar-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP02_14032019	14-Mar-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
TRIP BLANK 03	23-Apr-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 03	23-Apr-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK 04	16-May-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 04	16-May-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK 05_14062019	14-Jun-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 05_14062019	14-Jun-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK 06_16072019	16-Jul-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE06_16072019	16-Jul-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE07	15-Aug-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK 08_16092019	16-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 08_16092019	16-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
DUP08_16092019	16-Sep-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	0%	NC	NC	NC	NC	NC	NC	
SW4_16092019	16-Sep-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP08_16092019	16-Sep-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	0.03	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	**100%**	NC	NC	NC	NC	NC	NC	
TRIP BLANK 09_1931069	25-Sep-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 09_1931069	25-Sep-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIPBLANK09_181119	18-Nov-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE09_181119	18-Nov-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
DUP09_181119	18-Nov-19	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
SW4_181119	18-Nov-19	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP09_18112019	18-Nov-19	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
TRIPBLANK10_171219	17-Dec-19	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE10_171219	17-Dec-19	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
TRIP BLANK 13_2001333008	16-Jan-20	Trip Blank	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
RINSATE 13_2001333009	16-Jan-20	Rinsate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
QW12_2001333012	16-Jan-20	Duplicate	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
BH6_2001333004	16-Jan-20	Primary	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.01	
QW13_14392	16-Jan-20	Triplicate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.01	
Relative Percentage Difference			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	

Notes:
< - Less than laboratory limit of reporting
NC - Not calculated
µg/L - Micrograms per litre

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

fluoroalkyl Carboxylic Acids						Perfluoroalkyl Sulfonamides						
Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl-perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.02
< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 7
Quality Control Sample Analysis - PFAS
Williamtown Sand Syndicate

(n:2) Fluorotelomer Sulfonic Acids				Sum of PFAS		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
NC	NC	NC	NC	0%	0%	0%
< 0.05	< 0.05	< 0.05	< 0.05	0.01	0.01	0.01
< 0.01	< 0.05	< 0.01	< 0.01	0.03	< 0.05	< 0.1
NC	NC	NC	NC	**100%**	**86%**	**133%**
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
NC	NC	NC	NC	NC	NC	NC
< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.01	< 0.01
< 0.01	< 0.05	< 0.01	< 0.01	< 0.01	< 0.05	< 0.1
NC	NC	NC	NC	NC	NC	NC

ATTACHMENT A: LABORATORY REPORTS

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2001333**	Page	: 1 of 17
Amendment	: **1**		
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 16-Jan-2020 19:36
Order number	: 20193820	Date Analysis Commenced	: 17-Jan-2020
C-O-C number	: 7412	Issue Date	: 29-Jan-2020 15:53
Sampler	: DANIEL KOUSBROEK		
Site	: WSS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- Amendment (29/01/2020): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The specific data affected include sample BH-4 and BH-11 TPH_SG results.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.23	5.61	5.50	5.51	5.27
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		112	102	85	218	202
EA016: Calculated TDS (from Electrical Conductivity)									
Total Dissolved Solids (Calc.)	----	1	mg/L		73	66	55	142	131
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		12	13	13	24	16
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		22	6	4	7	3
Total Alkalinity as CaCO3	----	1	mg/L		22	6	4	7	3
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3	6	6	15	13
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		25	17	18	50	46
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		<1	2	2	3	<1
Magnesium	7439-95-4	1	mg/L		3	2	2	4	4
Sodium	7440-23-5	1	mg/L		16	13	13	30	27
Potassium	7440-09-7	1	mg/L		<1	<1	2	2	1
EG005(ED093)F: Dissolved Metals by ICP-AES									
Iron	7439-89-6	0.05	mg/L		4.43	0.73	<0.05	2.15	0.93
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Barium	7440-39-3	0.001	mg/L		0.003	0.004	0.014	0.032	0.010
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	<0.001	<0.001	0.002
Copper	7440-50-8	0.001	mg/L		0.002	0.005	0.006	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		0.011	0.014	0.014	0.010	0.006
Nickel	7440-02-0	0.001	mg/L		0.002	<0.001	<0.001	<0.001	0.003

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L		**0.044**	**0.010**	**0.009**	<0.005	**0.007**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	**0.2**	**0.2**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.21**	**0.72**	**0.71**	**1.86**	**1.63**
ø Total Cations	----	0.01	meq/L		**0.94**	**0.83**	**0.88**	**1.83**	**1.53**
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		----	----	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		----	----	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		----	----	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		----	----	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		----	----	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		----	----	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		----	----	<0.01	<0.01	<0.01
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**103**	**112**	**110**	**105**
Toluene-D8	2037-26-5	2	%		**123**	**102**	**111**	**116**	**106**
4-Bromofluorobenzene	460-00-4	2	%		**109**	**99.0**	**104**	**105**	**101**
EP231S: PFAS Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-1	BH-2	BH-4	BH-6	BH-7
				Client sampling date / time	16-Jan-2020 11:49	16-Jan-2020 11:25	16-Jan-2020 11:01	16-Jan-2020 13:23	16-Jan-2020 14:11
Compound	CAS Number	LOR	Unit		ES2001333-001	ES2001333-002	ES2001333-003	ES2001333-004	ES2001333-005
					Result	Result	Result	Result	Result
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		----	----	102	97.9	96.4
13C8-PFOA	----	0.02	%		----	----	101	104	93.4

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	BH-8	BH-11	MW239S	QW12	----
			Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit	ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	--------
				Result	Result	Result	Result	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.55**	**5.09**	**5.02**	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**318**	**168**	**423**	----	----
EA016: Calculated TDS (from Electrical Conductivity)								
Total Dissolved Solids (Calc.)	----	1	mg/L	**207**	**109**	**275**	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**16**	**12**	**33**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**7**	**2**	**2**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**7**	**2**	**2**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**13**	<1	**7**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**78**	**46**	**120**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	----	----
Magnesium	7439-95-4	1	mg/L	**4**	**3**	**8**	----	----
Sodium	7440-23-5	1	mg/L	**49**	**25**	**67**	----	----
Potassium	7440-09-7	1	mg/L	<1	<1	<1	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	**2.94**	**1.08**	**1.31**	**2.18**	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	----
Barium	7440-39-3	0.001	mg/L	**0.007**	**0.005**	**0.008**	**0.035**	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.002**	**0.002**	<0.001	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Manganese	7439-96-5	0.001	mg/L	**0.011**	**0.007**	**0.004**	**0.009**	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.003**	**0.002**	**0.001**	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
				Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	--------
					Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS - Continued									
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	----
Zinc	7440-66-6	0.005	mg/L		**0.011**	**0.005**	**0.007**	<0.005	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		<0.1	<0.1	<0.1	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.61**	**1.34**	**3.57**	----	----
ø Total Cations	----	0.01	meq/L		**2.46**	**1.33**	**3.57**	----	----
ø Ionic Balance	----	0.01	%		**----**	**----**	**0.03**	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup									
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup									
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
				Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	--------
					Result	Result	Result	Result	----
EP080: BTEXN - Continued									
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	----	----	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	----	----	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	----	----	<0.1	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	----	----	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	----	----	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	----	----	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
				Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	--------
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	----	----	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	----	----	<0.05	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	----	----	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	----	----	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	----	----	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	----	----	<0.05	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	----	----	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	----	----	<0.05	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	----	----	<0.05	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	----	----	<0.01	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	----	----	<0.01	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	----	----	<0.01	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	**106**	**100**	**112**	----
Toluene-D8	2037-26-5	2	%		**113**	**105**	**102**	**118**	----
4-Bromofluorobenzene	460-00-4	2	%		**104**	**100**	**94.1**	**109**	----
EP231S: PFAS Surrogate									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Client sample ID	BH-8	BH-11	MW239S	QW12	----
				Client sampling date / time	16-Jan-2020 14:33	16-Jan-2020 12:16	16-Jan-2020 12:56	16-Jan-2020 13:16	----
Compound	CAS Number	LOR	Unit		ES2001333-006	ES2001333-007	ES2001333-011	ES2001333-012	--------
					Result	Result	Result	Result	----
EP231S: PFAS Surrogate - Continued									
13C4-PFOS	----	0.02	%		**100**	----	----	**98.9**	----
13C8-PFOA	----	0.02	%		**96.4**	----	----	**98.8**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	Trip blank13	rinsate 13	----	----	----
			Client sampling date / time	16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit	ES2001333-008	ES2001333-009	--------	--------	--------
				Result	Result	----	----	----
EG005(ED093)F: Dissolved Metals by ICP-AES								
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	<0.001	<0.001	----	----	----
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	----	----	----
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup								
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	----	----	----
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup								
>C10 - C16 Fraction	----	100	µg/L	<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	----	----	----
>C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
				Client sampling date / time	16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
				Client sampling date / time	16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	----	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Trip blank13	rinsate 13	----	----	----
				Client sampling date / time	16-Jan-2020 14:49	16-Jan-2020 14:52	----	----	----
Compound	CAS Number	LOR	Unit		ES2001333-008	ES2001333-009	--------	--------	--------
					Result	Result	----	----	----
EP231P: PFAS Sums - Continued									
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		101	98.3	----	----	----
Toluene-D8	2037-26-5	2	%		96.5	94.0	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		95.4	92.0	----	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		93.8	101	----	----	----
13C8-PFOA	----	0.02	%		94.0	98.2	----	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2001333**	Page	: 1 of 12
Amendment	: **1**		
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Contact	: Shirley LeCornu
Address	: 95 MITCHELL ROAD CARDIFF NSW 2285	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 16-Jan-2020
Order number	: 20193820	Date Analysis Commenced	: 17-Jan-2020
C-O-C number	: 7412	Issue Date	: 29-Jan-2020
Sampler	: DANIEL KOUSBROEK		
Site	: WSS		
Quote number	: ME/114/19 ALS Compass		
No. of samples received	: 11		
No. of samples analysed	: 11		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)F: Dissolved Metals by ICP-AES (QC Lot: 2816943)									
ES2001333-001	BH-1	EG005F: Iron	7439-89-6	0.05	mg/L	4.43	4.47	0.743	0% - 20%
ES2001333-004	BH-6	EG005F: Iron	7439-89-6	0.05	mg/L	2.15	2.13	1.15	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 2815284)									
ES2001190-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.70	7.98	3.57	0% - 20%
ES2001333-006	BH-8	EA005-P: pH Value	----	0.01	pH Unit	5.55	5.10	8.45	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2815283)									
ES2001308-003	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	6980	6950	0.446	0% - 20%
ES2001190-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4400	4380	0.480	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 2815286)									
ES2001333-006	BH-8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	318	317	0.337	0% - 20%
ES2001388-006	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3230	3240	0.326	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2815285)									
ES2001309-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	226	230	1.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	226	230	1.41	0% - 20%
ES2001308-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	691	670	3.06	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	691	670	3.06	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 2815288)									
ES2001373-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	49	50	2.86	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 2815288) - continued									
ES2001373-007	Anonymous	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	49	50	2.86	0% - 20%
ES2001333-006	BH-8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	<1	150	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	<1	150	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2816448)									
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES2001308-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2320	2290	1.36	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2816449)									
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ES2001308-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1960	1980	1.04	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2816940)									
ES2001309-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	133	132	0.787	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	294	295	0.340	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1200	1210	0.831	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	29	0.00	0% - 20%
ES2001333-004	BH-6	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	30	29	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942)									
ES2001309-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.057	0.055	3.17	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.014	0.010	34.7	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.017	<0.005	111	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	3.45	3.70	7.06	0% - 20%
ES2001333-004	BH-6	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Barium	7440-39-3	0.001	mg/L	0.032	0.032	0.00	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2816942) - continued									
ES2001333-004	BH-6	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Manganese	7439-96-5	0.001	mg/L	0.010	0.009	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2816941)									
ES2001309-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES2001333-003	BH-4	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 2815282)									
ES2001094-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.2	<0.1	0.00	No Limit
ES2001309-006	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.3	1.4	0.00	0% - 50%
EK040P: Fluoride by PC Titrator (QC Lot: 2815287)									
ES2001373-007	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES2001333-006	BH-8	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES2001333-007	BH-11	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2001333-007	BH-11	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2814107)									
ES2001333-001	BH-1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES2001333-007	BH-11	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2814107) - continued									
ES2001333-007	BH-11	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.09	0.09	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.58	0.59	0.00	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.31	0.31	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.09	0.08	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 2813818) - continued									
EP2000293-004	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES2001261-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.27	0.30	7.72	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 2813818) - continued									
ES2001261-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 2813818)									
EP2000293-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.00	No Limit
ES2001261-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.43	1.46	2.08	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)F: Dissolved Metals by ICP-AES (QCLot: 2816943)								
EG005F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	112	82.0	114
EA005P: pH by PC Titrator (QCLot: 2815284)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.0	102
				----	7 pH Unit	100	98.0	102
EA010P: Conductivity by PC Titrator (QCLot: 2815283)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	97.7	95.0	113
EA010P: Conductivity by PC Titrator (QCLot: 2815286)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2100 µS/cm	98.2	95.0	113
ED037P: Alkalinity by PC Titrator (QCLot: 2815285)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	88.1	81.0	111
				----	50 mg/L	108	70.0	130
ED037P: Alkalinity by PC Titrator (QCLot: 2815288)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	81.7	81.0	111
				----	50 mg/L	112	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2816448)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.2	82.0	122
				<1	500 mg/L	91.3	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 2816449)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.6	80.9	127
				<1	1000 mg/L	109	80.9	127
ED093F: Dissolved Major Cations (QCLot: 2816940)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	111	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.5	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	96.2	85.0	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.7	82.0	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.0	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	93.1	85.0	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.4	82.0	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.4	81.0	111

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942) - continued								
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.4	83.0	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	97.1	82.0	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.0	82.0	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	94.9	85.0	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	93.0	83.0	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.0	81.0	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	96.1	85.0	115
EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.2	83.0	105
EK040P: Fluoride by PC Titrator (QCLot: 2815282)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	116	82.0	116
EK040P: Fluoride by PC Titrator (QCLot: 2815287)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	92.0	82.0	116
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 2814393)								
EP071SG: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	56.6	55.8	112
EP071SG: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	102	71.6	113
EP071SG: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	105	56.0	121
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 2814393)								
EP071SG: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	82.8	57.9	119
EP071SG: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	89.9	62.5	110
EP071SG: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	70.5	61.5	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.7	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.7	75.0	127
EP080: BTEXN (QCLot: 2814107)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	101	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	99.5	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	70.0	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	96.0	69.0	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	96.8	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	102	70.0	120
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	80.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	90.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.25 µg/L	82.0	68.0	131

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued								
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.4	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	93.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	88.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	90.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	96.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.0	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	93.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	98.8	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	89.4	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.8	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	94.0	70.0	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	97.6	70.0	130
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	88.0	67.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	102	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	116	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2816448)							
ES2000539-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	116	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2816449)							
ES2000539-003	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	106	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2816942)							
ES2001309-004	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	105	70.0	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	96.1	70.0	130
		EG020A-F: Barium	7440-39-3	10 mg/L	110	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.8	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.6	70.0	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	102	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	100.0	70.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	100	70.0	130
		EG020A-F: Manganese	7439-96-5	10 mg/L	97.4	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70.0	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.1	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	85.7	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2816941)							
ES2001309-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	85.6	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2815282)							
ES2001094-002	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	97.6	70.0	130
EK040P: Fluoride by PC Titrator (QCLot: 2815287)							
ES2001333-004	BH-6	EK040P: Fluoride	16984-48-8	5 mg/L	80.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: C6 - C9 Fraction	----	325 µg/L	107	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	105	70.0	130
EP080: BTEXN (QCLot: 2814107)							
ES2001333-001	BH-1	EP080: Benzene	71-43-2	25 µg/L	101	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	105	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	105	70.0	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	97.4	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.4	50.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 2813818) - continued							
EP2000395-001	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	99.2	50.0	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	94.4	50.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	99.4	50.0	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	102	50.0	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	98.0	50.0	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	50.0	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	50.0	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	111	50.0	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	50.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	91.0	50.0	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	111	50.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	104	50.0	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	109	50.0	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	112	50.0	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	112	50.0	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	104	50.0	150
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	50.0	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	98.4	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.4	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	119	50.0	150
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	106	50.0	150
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	50.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	50.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 2813818)							
EP2000395-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	99.6	50.0	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	50.0	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	106	50.0	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	110	50.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2001333**	Page	: 1 of 10
Amendment	: **1**		
Client	: **KLEINFELDER AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: DANIEL KOUSBROEK	Telephone	: +6138549 9630
Project	: Williamtown SS	Date Samples Received	: 16-Jan-2020
Site	: WSS	Issue Date	: 29-Jan-2020
Sampler	: DANIEL KOUSBROEK	No. of samples received	: 11
Order number	: 20193820	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	----	----	----	17-Jan-2020	16-Jan-2020	**1**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Dissolved Metals by ICP-AES	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**17-Jan-2020**	16-Jan-2020	✘

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**17-Jan-2020**	13-Feb-2020	✓
EA065: Total Hardness as CaCO3							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**21-Jan-2020**	13-Feb-2020	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**17-Jan-2020**	30-Jan-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**18-Jan-2020**	13-Feb-2020	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**18-Jan-2020**	13-Feb-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**21-Jan-2020**	13-Feb-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005(ED093)F: Dissolved Metals by ICP-AES							
Clear Plastic Bottle - Nitric Acid; Filtered (EG005F)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**----**	----	----	**20-Jan-2020**	14-Jul-2020	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**----**	----	----	**21-Jan-2020**	14-Jul-2020	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**----**	----	----	**21-Jan-2020**	13-Feb-2020	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, MW239S	**16-Jan-2020**	**----**	----	----	**17-Jan-2020**	13-Feb-2020	✓
EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**17-Jan-2020**	23-Jan-2020	✓	**22-Jan-2020**	26-Feb-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup							
Amber Glass Bottle - Unpreserved (EP071SG)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**17-Jan-2020**	23-Jan-2020	✓	**22-Jan-2020**	26-Feb-2020	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**21-Jan-2020**	30-Jan-2020	✓	**21-Jan-2020**	30-Jan-2020	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**21-Jan-2020**	30-Jan-2020	✓	**21-Jan-2020**	30-Jan-2020	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH-1, BH-2, BH-4, BH-6, BH-7, BH-8, BH-11, Trip blank13, rinsate 13, MW239S, QW12	**16-Jan-2020**	**21-Jan-2020**	30-Jan-2020	✓	**21-Jan-2020**	30-Jan-2020	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, Trip blank13, rinsate 13, QW12	**16-Jan-2020**	**17-Jan-2020**	14-Jul-2020	✓	**17-Jan-2020**	14-Jul-2020	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, Trip blank13, rinsate 13, QW12	**16-Jan-2020**	**17-Jan-2020**	14-Jul-2020	✓	**17-Jan-2020**	14-Jul-2020	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, Trip blank13, rinsate 13, QW12	**16-Jan-2020**	**17-Jan-2020**	14-Jul-2020	✓	**17-Jan-2020**	14-Jul-2020	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, Trip blank13, rinsate 13, QW12	**16-Jan-2020**	**17-Jan-2020**	14-Jul-2020	✓	**17-Jan-2020**	14-Jul-2020	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
BH-4, BH-6, BH-7, BH-8, Trip blank13, rinsate 13, QW12	**16-Jan-2020**	**17-Jan-2020**	14-Jul-2020	✓	**17-Jan-2020**	14-Jul-2020	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Method Blanks (MB) - Continued							
Major Cations - Dissolved	ED093F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-AES	EG005F	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Fluoride by PC Titrator	EK040P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Calculated TDS (from Electrical Conductivity)	EA016	WATER	In house: Calculation from Electrical Conductivity (APHA 2510 B) using a conversion factor specified in the analytical report. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-AES	EG005F	WATER	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. The ICPAES technique ionises the 0.45µm filtered samples, emitting a characteristic spectrum which is compared against matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	In house: Referenced to APHA 4500-F C: CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup	EP071SG	WATER	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.

Preparation Methods	Method	Matrix	Method Descriptions
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

ALSCompass
SAMPLING Intelligence

Environmental Division
Sydney
Work Order Reference
ES2001333

Telephone : +61-2-8784 8555

Custody Document for Submissions via ALS Compass App

Project: WSS **Client:** Kleinfelder **Project Manager:** Tom Overton.
Phone: ( )

ALS Compass COC Reference: 7412 - **# Samples:** 12. **Sampler:** Daniel Mousbroek
Phone: (0458197676)

Turnaround Requirements: Standard 5 Days Urgent

Special Instructions:

Subcon / ~~Forward Lab~~ / Split WO
Lab / Analysis: EUROFINS
Organised By / Date: QW13
Relinquished By / Date:
Connote / Courier:
WO No:
Attached By PO / Internal Sheet:

ALS Use Only

Custody seal intact?	YES	NO	(N/A)
Free (ice) / frozen ice bricks upon receipt?	(YES)	NO	N/A
Random sample temperature on receipt?	-2.6 °C		

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
D. Mousbroek	AL		ANDREW
Date / Time:	**Date / Time:**	**Date / Time:**	**Date / Time:**
16/1/20 355	16/1/2020 3:57pm.		16/1/2020 7:30pm

CHAIN OF CUSTODY

(ALS) COC#: 7412 *ALS Laboratory:* ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	JUSTIN DATE TIME: 16/1/20 7.36pm	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: ~~6.4~~ C -2.6°C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIO INFORMA
001	BH-1		16/01/2020 11:49 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
002	BH-2		16/01/2020 11:25 AM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
003	BH-4		16/01/2020 11:01 AM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
004	BH-6		16/01/2020 01:23 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
005	BH-7		16/01/2020 02:11 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
006	BH-8		16/01/2020 02:33 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X	X		
007	BH-11		16/01/2020 12:16 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
008	Trip blank13		16/01/2020 02:49 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		
009	rinsate 13		16/01/2020 02:52 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 7412 *ALS Laboratory:* ES Sydney

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	JUSTIN DATE TIME: 16/1/20 7.36pm	DATE TIME:	DATE TIME:

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comments:			

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0 010

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SAMPLE DETAILS							ANALYSIS REQUIRED						
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Dissolved Iron Only Iron (Dissolved) WATER	EP231X PFAS - Full Suite (28 Analytes) WATER	NT-12 General Water Suite (Incl pH) WATER	W-03 NEPM 15 Metals (dissolved) WATER	W-04 SG TRH/BTEXN Incl. Silica Gel Clean Up WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	QW13	Please send to Eurofins as triplicate control	16/01/2020 01:20 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		Send to eurofins
011	MW239S		16/01/2020 12:56 PM	Water	ALS: 5 Non ALS: 0	No	X		X	X	X		
012	QW12		16/01/2020 01:16 PM	Water	ALS: 5 Non ALS: 0	No	X	X		X	X		

CHAIN OF CUSTODY

(ALS) COC#: 7412 *ALS Laboratory:* ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

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EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: JUSTIN 16/1/20 7.30pm	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061199	Purple	No	
001	BH-1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038844	Red	Yes	
001	BH-1	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061212	Purple	No	
001	BH-1	Amber Glass Bottle - Unpreserved	100 mL	00400719020804	Orange	No	
001	BH-1	Clear Plastic Bottle - Natural	500 mL	00070519029791	Green	No	
002	BH-2	Clear Plastic Bottle - Natural	500 mL	00070519076921	Green	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061202	Purple	No	
002	BH-2	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061144	Purple	No	
002	BH-2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038848	Red	Yes	
002	BH-2	Amber Glass Bottle - Unpreserved	100 mL	00400719020798	Orange	No	
003	BH-4	Clear Plastic Bottle - Natural	500 mL	00070519076939	Green	No	
003	BH-4	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038847	Red	Yes	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061207	Purple	No	
003	BH-4	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061222	Purple	No	
003	BH-4	HDPE (no PTFE)	60 mL	00350019045458	Grey	No	
003	BH-4	Amber Glass Bottle - Unpreserved	100 mL	00400719020213	Orange	No	
004	BH-6	Clear Plastic Bottle - Natural	500 mL	00070519029773	Green	No	
004	BH-6	Amber Glass Bottle - Unpreserved	100 mL	00400719020262	Orange	No	
004	BH-6	HDPE (no PTFE)	60 mL	00350019045554	Grey	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061418	Purple	No	
004	BH-6	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061312	Purple	No	
004	BH-6	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034289	Red	Yes	
005	BH-7	Clear Plastic Bottle - Natural	500 mL	00070519029766	Green	No	
005	BH-7	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034265	Red	Yes	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063033	Purple	No	
005	BH-7	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063133	Purple	No	

CHAIN OF CUSTODY

(ALS) COC#: 7412 *ALS Laboratory:* ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0 010

EMAIL REPORTS TO: dkousbroek@kleinfelder.com, toverton@kleinfelder.com

EMAIL INVOICES TO: dkousbroek@kleinfelder.com

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	JUSTIN DATE TIME: 16/1/20 7.36PM	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

005	BH-7	Amber Glass Bottle - Unpreserved	100 mL	00400719020175	Orange	No	
005	BH-7	HDPE (no PTFE)	60 mL	00350019045566	Grey	No	
006	BH-8	Clear Plastic Bottle - Natural	500 mL	00070519076941	Green	No	
006	BH-8	Amber Glass Bottle - Unpreserved	100 mL	00400719020136	Orange	No	
006	BH-8	HDPE (no PTFE)	60 mL	00350019045403	Grey	No	
006	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063008	Purple	No	
006	BH-8	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063157	Purple	No	
006	BH-8	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034267	Red	Yes	
007	BH-11	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198038859	Red	Yes	
007	BH-11	Clear Plastic Bottle - Natural	500 mL	00070519029603	Green	No	
007	BH-11	Amber Glass Bottle - Unpreserved	100 mL	00400719020783	Orange	No	
007	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061180	Purple	No	
007	BH-11	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061302	Purple	No	
008	Trip blank13	Amber Glass Bottle - Unpreserved	100 mL	00400719020196	Orange	No	
008	Trip blank13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063056	Purple	No	
008	Trip blank13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063184	Purple	No	
008	Trip blank13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034279	Red	Yes	
008	Trip blank13	HDPE (no PTFE)	60 mL	00350019045430	Grey	No	
009	rinsate 13	HDPE (no PTFE)	60 mL	00350019000564	Grey	No	
009	rinsate 13	Amber Glass Bottle - Unpreserved	100 mL	00400719020821	Orange	No	
009	rinsate 13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063165	Purple	No	
009	rinsate 13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034269	Red	Yes	
009	rinsate 13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019063205	Purple	No	
010	QW13	Amber Glass Bottle - Unpreserved	100 mL	00400719020273	Orange	No	
010	QW13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061242	Purple	No	
010	QW13	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034150	Red	Yes	
010	QW13	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061198	Purple	No	

CHAIN OF CUSTODY

(ALS) COC#: 7412 *ALS Laboratory:* ES Sydney

CLIENT: ALLENVENG - KLEINFELDER AUSTRALIA PTY LTD

PROJECT: Williamtown SS

SITE: WSS

ORDER NO: 20193820

PROJECT MANAGER: Dkousbroek Dkousbroek CONTACT PH: 0458 197 676 SAMPLER MOBILE: 0458 197 676

PRIMARY SAMPLER: Dkousbroek Dkousbroek QUOTE NO: ME/114/19 / EM2019ALLENVENG0010

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RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	JUSTIN DATE TIME: 16/1/20 7.76pm	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

010	QW13	HDPE (no PTFE)	60 mL	00350019045461	Grey	No	
011	MW239S	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034271	Red	Yes	
011	MW239S	Clear Plastic Bottle - Natural	500 mL	00070519076938	Green	No	
011	MW239S	Amber Glass Bottle - Unpreserved	100 mL	00400719020023	Orange	No	
011	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061233	Purple	No	
011	MW239S	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061297	Purple	No	
012	QW12	HDPE (no PTFE)	60 mL	00350019045327	Grey	No	
012	QW12	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00120198034276	Red	Yes	
012	QW12	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061238	Purple	No	
012	QW12	Amber VOC Vial - Sulfuric Acid	40 mL	00161019061225	Purple	No	
012	QW12	Amber Glass Bottle - Unpreserved	100 mL	00400719020245	Orange	No	

Total Bottle Count: ALS: 64, Non ALS: 0

eurofins | Environment Testing

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IANZ # 1290

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285

Project Name: WILLIAMTOWN SS
Project ID: 20193820

Order No.:
Report #: 697336
Phone: 02 4949 5200
Fax:

Received: Jan 17, 2020 5:24 PM
Due: Jan 24, 2020
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins | mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
Test Counts						1	1	1	1	1

Kleinfelder Australia Pty Ltd (NEWC)
95 Mitchell Rd
Cardiff
NSW 2285

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Dan Kousbroek**

Report **697336-W**
Project name WILLIAMTOWN SS
Project ID 20193820
Received Date Jan 17, 2020

Client Sample ID			**QW13**
Sample Matrix			**Water**
Eurofins Sample No.			**S20-Ja14392**
Date Sampled			**Jan 16, 2020**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	0.25
TRH C15-C28	0.1	mg/L	0.3
TRH C29-C36	0.1	mg/L	0.1
TRH C10-C36 (Total)	0.1	mg/L	0.65
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	89
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	0.21
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	0.21
TRH >C16-C34	0.1	mg/L	0.4
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.61
TRH - 2013 NEPM Fractions (after silica gel clean-up)			
TRH >C10-C16 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH >C16-C34 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH >C34-C40 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH - 1999 NEPM Fractions (after silica gel clean-up)			
TRH C10-C36 (Total) (after silica gel clean-up)	0.4	mg/L	< 0.1
TRH C10-C14 (after silica gel clean-up)	0.05	mg/L	< 0.05
TRH C15-C28 (after silica gel clean-up)	0.1	mg/L	< 0.1
TRH C29-C36 (after silica gel clean-up)	0.1	mg/L	< 0.1
Chromium (hexavalent)	0.005	mg/L	< 0.005
Chromium (trivalent filtered)	0.005	mg/L	< 0.005

Client Sample ID			QW13
Sample Matrix			Water
Eurofins Sample No.			S20-Ja14392
Date Sampled			Jan 16, 2020
Test/Reference	LOR	Unit	
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Barium (filtered)	0.02	mg/L	0.03
Beryllium (filtered)	0.001	mg/L	< 0.001
Boron (filtered)	0.05	mg/L	< 0.05
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Cobalt (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	0.004
Iron (filtered)	0.05	mg/L	1.6
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.009
Mercury (filtered)	0.0001	mg/L	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001
Vanadium (filtered)	0.005	mg/L	< 0.005
Zinc (filtered)	0.005	mg/L	0.012
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	83
13C5-PFPeA (surr.)	1	%	97
13C5-PFHxA (surr.)	1	%	106
13C4-PFHpA (surr.)	1	%	102
13C8-PFOA (surr.)	1	%	108
13C5-PFNA (surr.)	1	%	112
13C6-PFDA (surr.)	1	%	72
13C2-PFUnDA (surr.)	1	%	45
13C2-PFDoDA (surr.)	1	%	28
13C2-PFTeDA (surr.)	1	%	73
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	53

Client Sample ID			QW13
Sample Matrix			Water
Eurofins Sample No.			S20-Ja14392
Date Sampled			Jan 16, 2020
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D3-N-MeFOSA (surr.)	1	%	43
D5-N-EtFOSA (surr.)	1	%	33
D7-N-MeFOSE (surr.)	1	%	20
D9-N-EtFOSE (surr.)	1	%	19
D5-N-EtFOSAA (surr.)	1	%	INT
D3-N-MeFOSAA (surr.)	1	%	39
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	118
18O2-PFHxS (surr.)	1	%	29
13C8-PFOS (surr.)	1	%	104
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.01	ug/L	< 0.01
13C2-4:2 FTSA (surr.)	1	%	70
13C2-6:2 FTSA (surr.)	1	%	93
13C2-8:2 FTSA (surr.)	1	%	70
PFASs Summations			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B1			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jan 17, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jan 17, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jan 17, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jan 17, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 2013 NEPM Fractions (after silica gel clean-up)	Sydney	Jan 17, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
TRH - 1999 NEPM Fractions (after silica gel clean-up)	Sydney	Jan 17, 2020	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
NEPM 1999 Metals : Metals M15 (Filtered)			
Chromium (hexavalent)	Sydney	Jan 17, 2020	28 Days
- Method: E057 Total Speciated Chromium			
Chromium (trivalent filtered)	Sydney	Jan 17, 2020	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Heavy Metals (filtered)	Sydney	Jan 20, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Mobil Metals : Metals M15	Sydney	Jan 17, 2020	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Jan 21, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Jan 21, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Jan 21, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Jan 21, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins | Environment Testing

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IANZ # 1290

Company Name: Kleinfelder Aust Pty Ltd (NEWCASTLE)
Address: 95 Mitchell Rd
Cardiff
NSW 2285

Project Name: WILLIAMTOWN SS
Project ID: 20193820

Order No.:
Report #: 697336
Phone: 02 4949 5200
Fax:

Received: Jan 17, 2020 5:24 PM
Due: Jan 24, 2020
Priority: 5 Day
Contact Name: Dan Kousbroek

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Iron (filtered)	TRH (after Silica Gel cleanup)	Eurofins | mgt Suite B1	NEPM 1999 Metals : Metals M15 (Filtered)	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217						X	X	X	X	
Brisbane Laboratory - NATA Site # 20794										X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	QW13	Jan 16, 2020		Water	S20-Ja14392	X	X	X	X	X
Test Counts						1	1	1	1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	mg/L	< 0.05			0.05	Pass	
TRH C15-C28 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
TRH C29-C36 (after silica gel clean-up)	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Barium (filtered)	mg/L	< 0.02			0.02	Pass	
Beryllium (filtered)	mg/L	< 0.001			0.001	Pass	
Boron (filtered)	mg/L	< 0.05			0.05	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Cobalt (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Vanadium (filtered)	mg/L	< 0.005			0.005	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	90			70-130	Pass	
TRH C10-C14	%	72			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	89			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	90			70-130	Pass	
m&p-Xylenes	%	87			70-130	Pass	
o-Xylene	%	89			70-130	Pass	
Xylenes - Total	%	88			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	86			70-130	Pass	
TRH C6-C10	%	93			70-130	Pass	
TRH >C10-C16	%	70			70-130	Pass	
LCS - % Recovery							
TRH - 2013 NEPM Fractions (after silica gel clean-up)							
TRH >C10-C16 (after silica gel clean-up)	%	86			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
TRH - 1999 NEPM Fractions (after silica gel clean-up)							
TRH C10-C14 (after silica gel clean-up)	%	88			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	95			70-130	Pass	
Barium (filtered)	%	96			70-130	Pass	
Beryllium (filtered)	%	121			70-130	Pass	
Boron (filtered)	%	80			70-130	Pass	
Cadmium (filtered)	%	91			70-130	Pass	
Chromium (filtered)	%	94			70-130	Pass	
Cobalt (filtered)	%	94			70-130	Pass	
Copper (filtered)	%	94			70-130	Pass	
Iron (filtered)	%	91			70-130	Pass	
Lead (filtered)	%	95			70-130	Pass	
Manganese (filtered)	%	91			70-130	Pass	
Mercury (filtered)	%	97			70-130	Pass	
Nickel (filtered)	%	95			70-130	Pass	
Vanadium (filtered)	%	95			70-130	Pass	
Zinc (filtered)	%	92			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	67			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	67			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	65			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	62			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	64			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	60			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	60			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	65			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	65			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	101			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	60			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	61			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	51			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	57			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	52			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	57			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	66			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	57			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	82			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	56			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	61			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	63			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	60			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	64			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	56			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	71			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	60			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	67			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	59			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S20-Ja14168	NCP	%	98			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S20-Ja14168	NCP	%	90			70-130	Pass	
Toluene	S20-Ja14168	NCP	%	95			70-130	Pass	
Ethylbenzene	S20-Ja14168	NCP	%	95			70-130	Pass	
m&p-Xylenes	S20-Ja14168	NCP	%	91			70-130	Pass	
o-Xylene	S20-Ja14168	NCP	%	95			70-130	Pass	
Xylenes - Total	S20-Ja14168	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S20-Ja14168	NCP	%	95			70-130	Pass	
TRH C6-C10	S20-Ja14168	NCP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	S20-Ja14392	CP	%	97			70-130	Pass	
Barium (filtered)	S20-Ja14392	CP	%	92			70-130	Pass	
Beryllium (filtered)	S20-Ja14392	CP	%	107			70-130	Pass	
Boron (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Cadmium (filtered)	S20-Ja14392	CP	%	92			70-130	Pass	
Chromium (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Cobalt (filtered)	S20-Ja14392	CP	%	91			70-130	Pass	
Copper (filtered)	S20-Ja14392	CP	%	89			70-130	Pass	
Iron (filtered)	S20-Ja14392	CP	%	25			70-130	Fail	Q08
Lead (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Manganese (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Mercury (filtered)	S20-Ja14392	CP	%	48			70-130	Fail	Q08
Nickel (filtered)	S20-Ja14392	CP	%	90			70-130	Pass	
Vanadium (filtered)	S20-Ja14392	CP	%	96			70-130	Pass	
Zinc (filtered)	S20-Ja14392	CP	%	93			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M20-Ja14783	NCP	%	101			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M20-Ja14783	NCP	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M20-Ja14783	NCP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M20-Ja14783	NCP	%	93			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M20-Ja14783	NCP	%	89			50-150	Pass	
Perfluorononanoic acid (PFNA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M20-Ja14783	NCP	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M20-Ja14783	NCP	%	135			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14783	NCP	%	91			50-150	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M20-Ja14783	NCP	%	99			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14783	NCP	%	88			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14783	NCP	%	94			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14783	NCP	%	89			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14783	NCP	%	90			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14783	NCP	%	93			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14783	NCP	%	90			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14783	NCP	%	104			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M20-Ja14783	NCP	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14783	NCP	%	95			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14783	NCP	%	91			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14783	NCP	%	89			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14783	NCP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14783	NCP	%	93			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14783	NCP	%	59			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14783	NCP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14783	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14783	NCP	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14783	NCP	%	81			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S20-Ja14392	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S20-Ja14392	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S20-Ja14392	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S20-Ja14392	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S20-Ja14392	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	S20-Ja10862	NCP	mg/L	0.027	0.029	8.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Barium (filtered)	S20-Ja13841	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Beryllium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Boron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Cadmium (filtered)	S20-Ja13841	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cobalt (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	S20-Ja13841	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Mercury (filtered)	S20-Ja13841	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	S20-Ja13841	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Vanadium (filtered)	S20-Ja13841	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	S20-Ja13841	NCP	mg/L	0.035	0.037	6.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M20-Ja14774	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

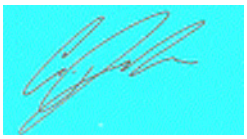
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Inorganic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Sarah McCallion	Senior Analyst-PFAS (QLD)



Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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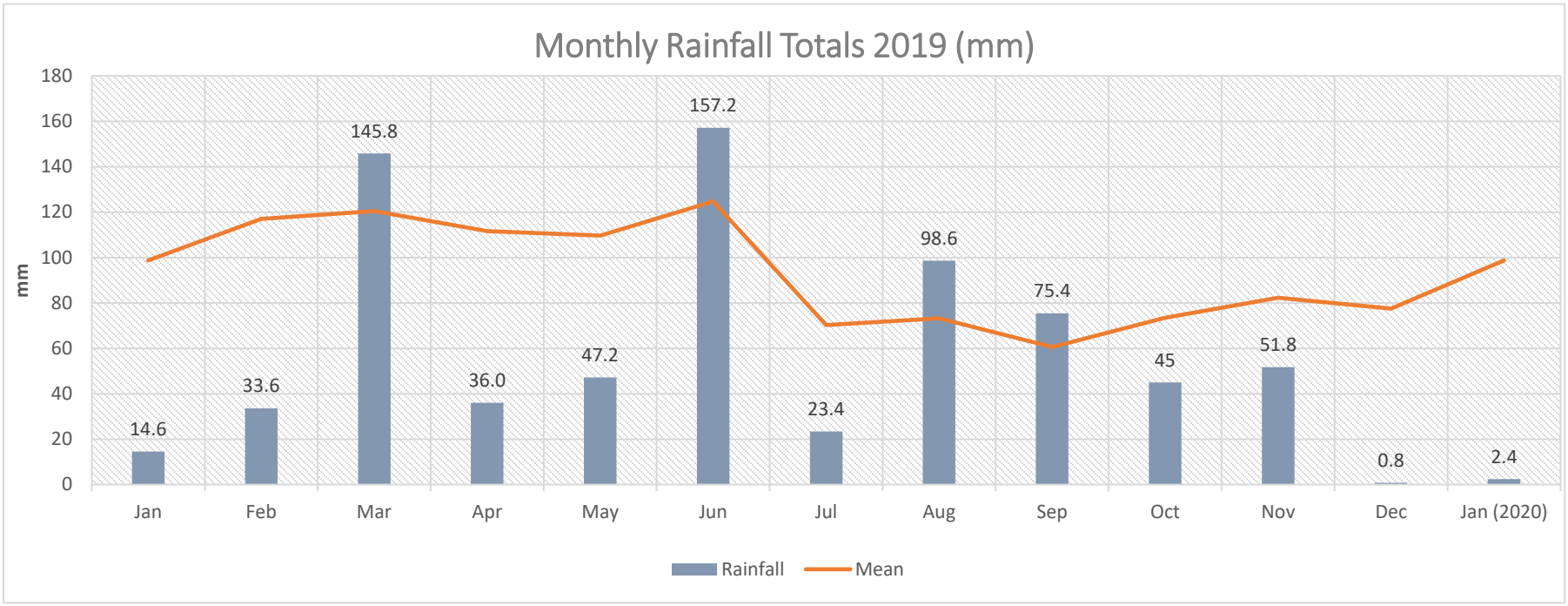
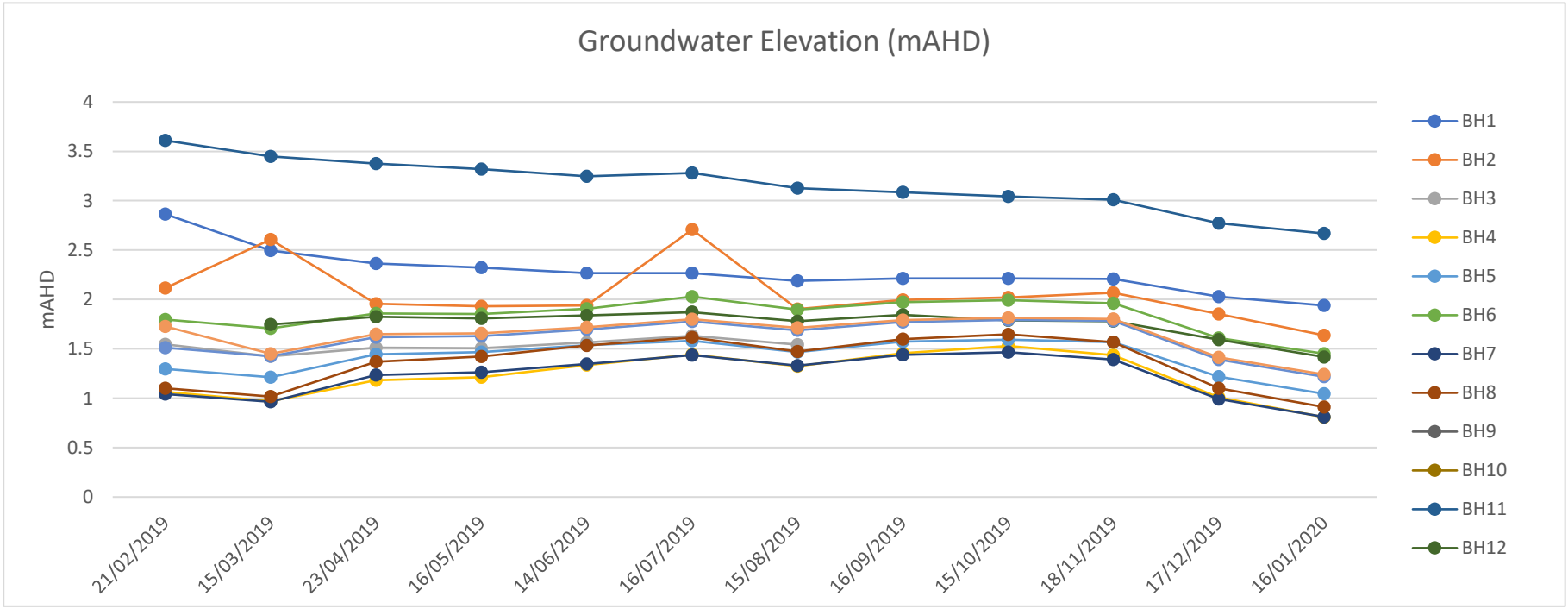
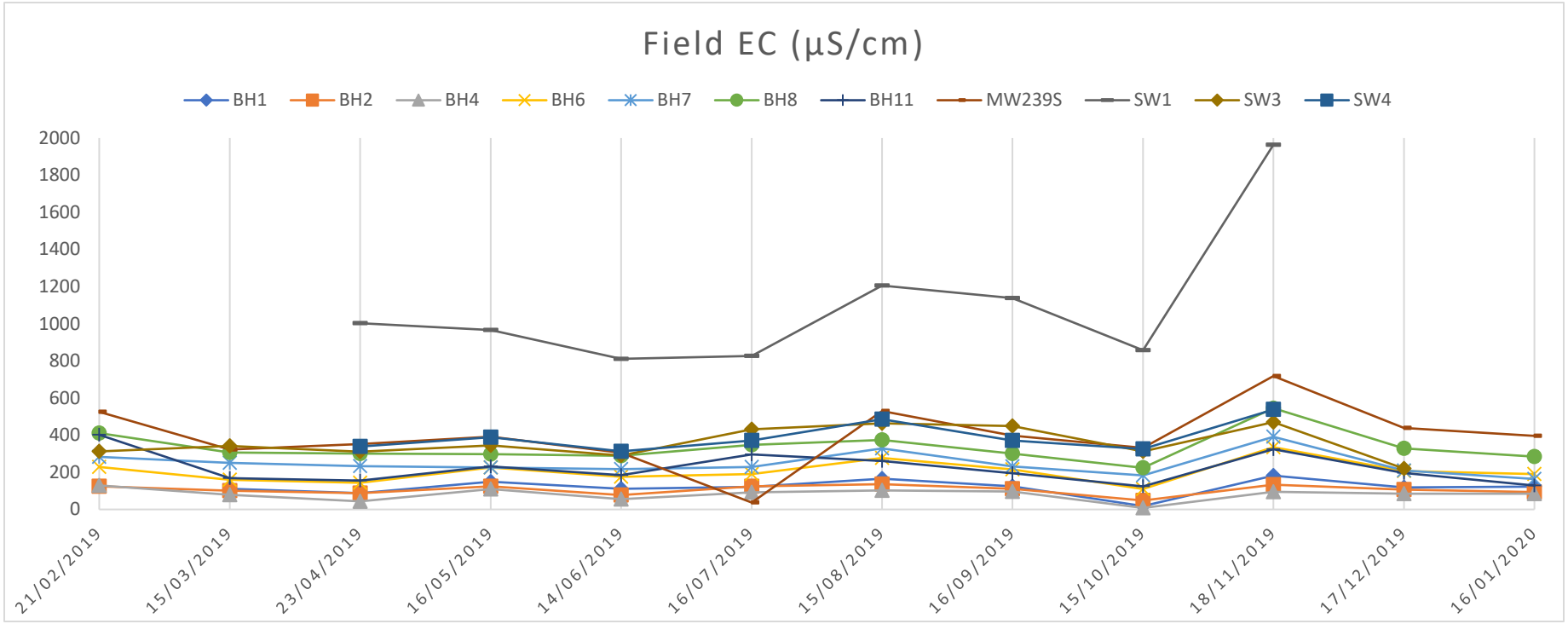
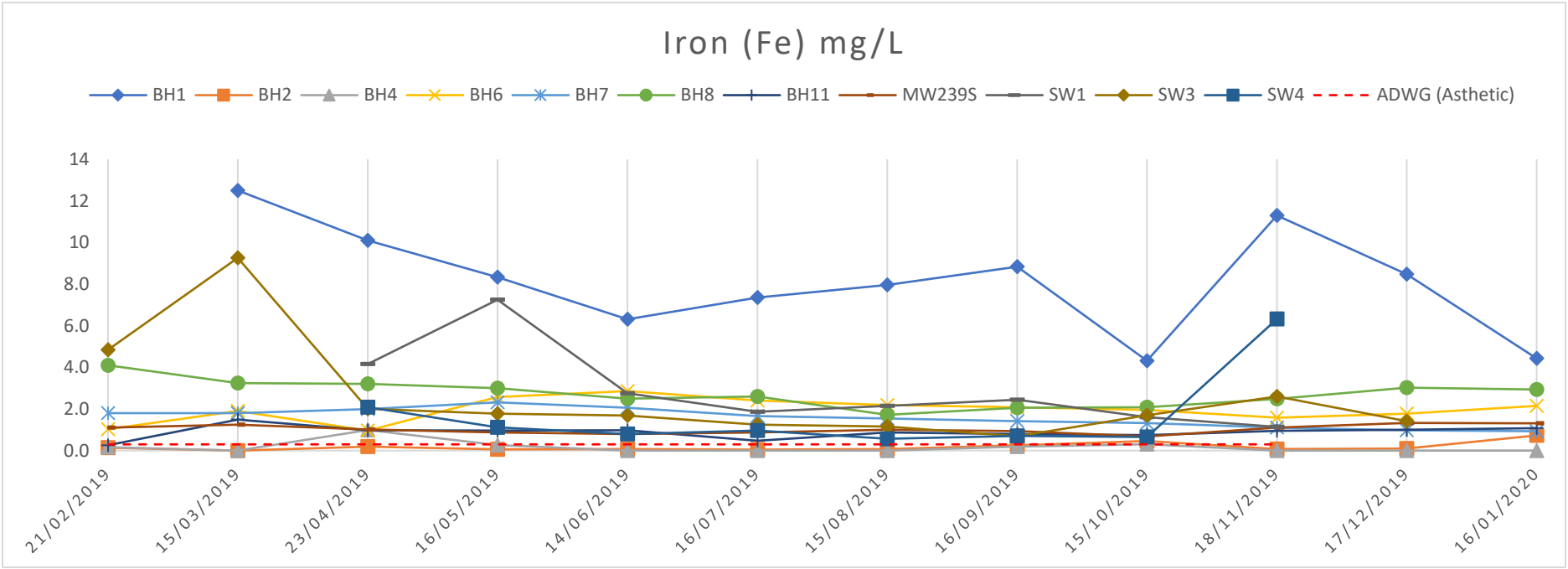
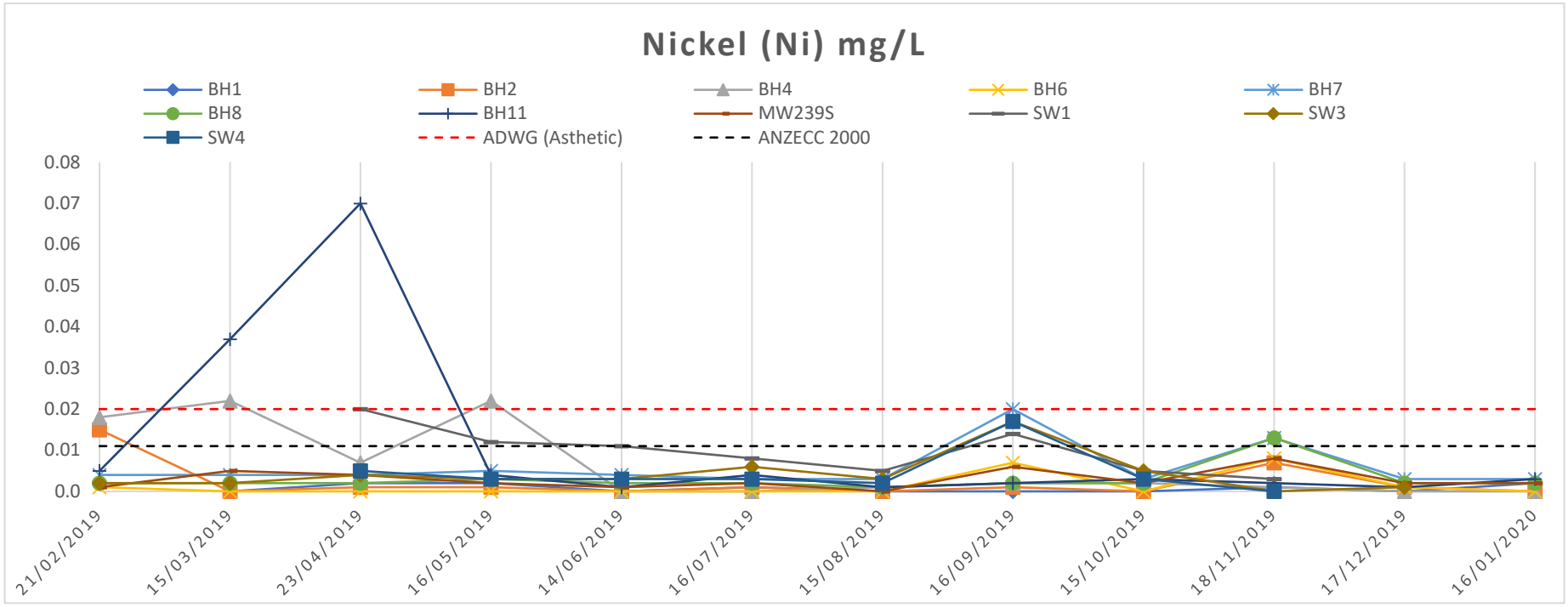
ATTACHMENT B: TREND DATA

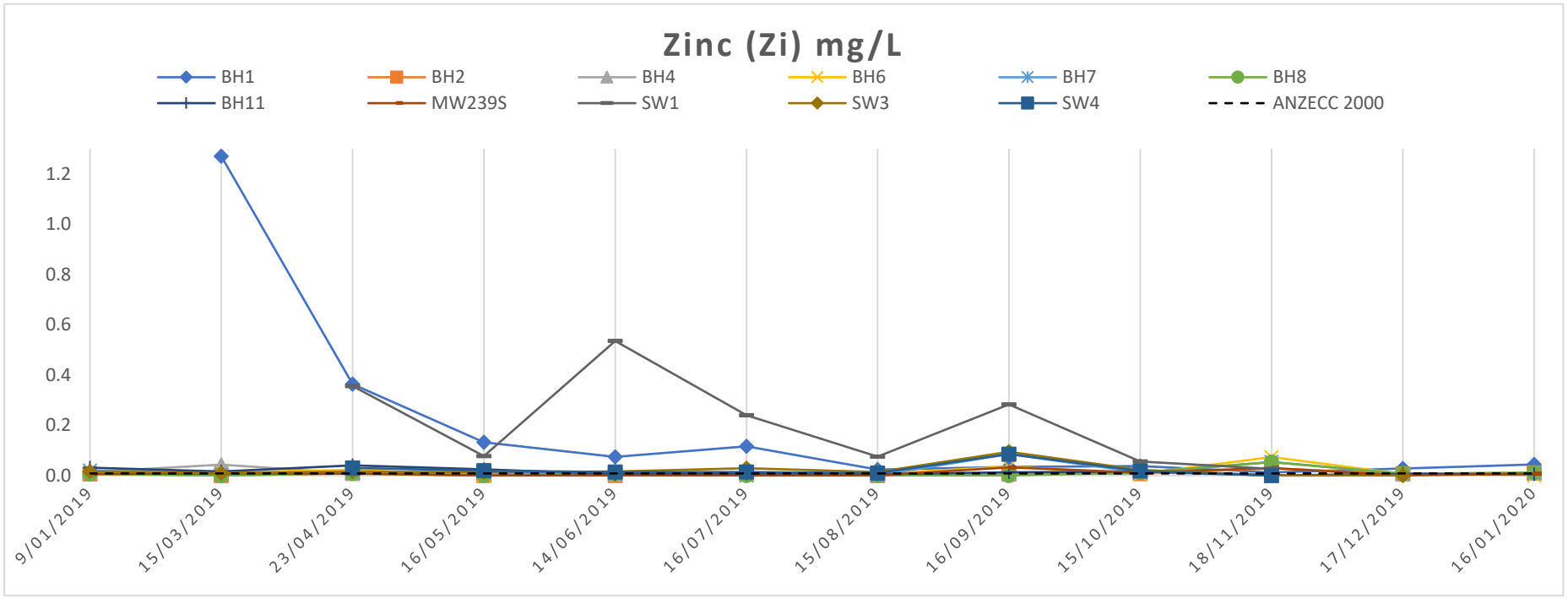

Monthly Rainfall Totals 2019 (mm)
mm
180
160
140
120
100
80
60
40
20
0
14.6
33.6
145.8
36.0
47.2
157.2
23.4
98.6
75.4
45
51.8
0.8
2.4
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan (2020)
Rainfall
Mean

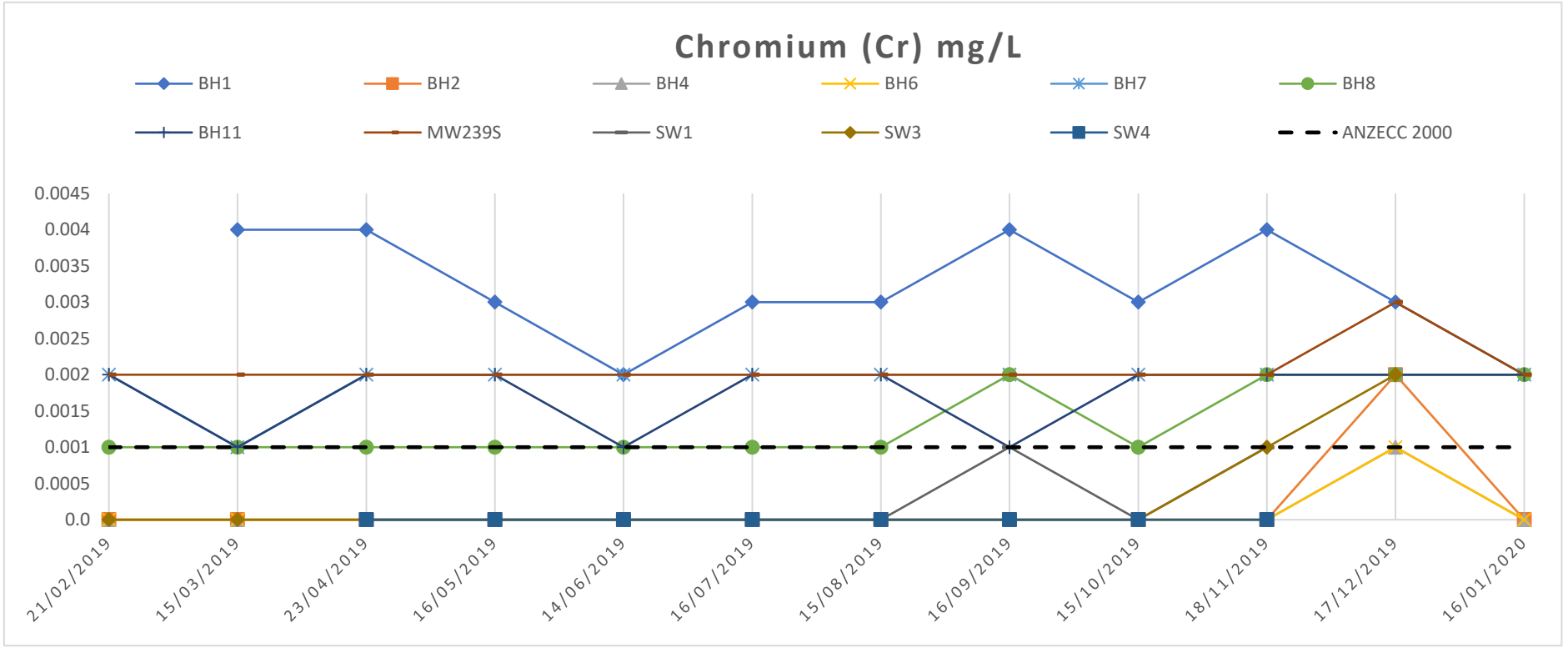

Groundwater Elevation (mAHD)
mAHD
4
3.5
3
2.5
2
1.5
1
0.5
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
BH12

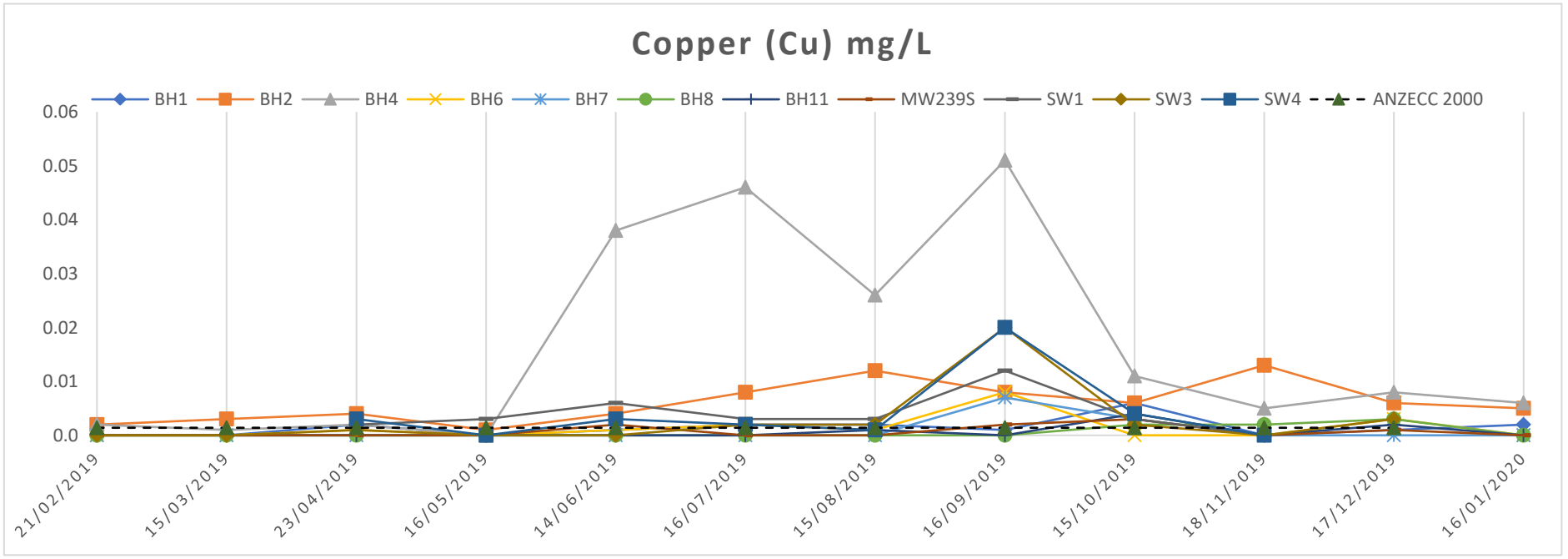

Field EC (µS/cm)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
2000
1800
1600
1400
1200
1000
800
600
400
200
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

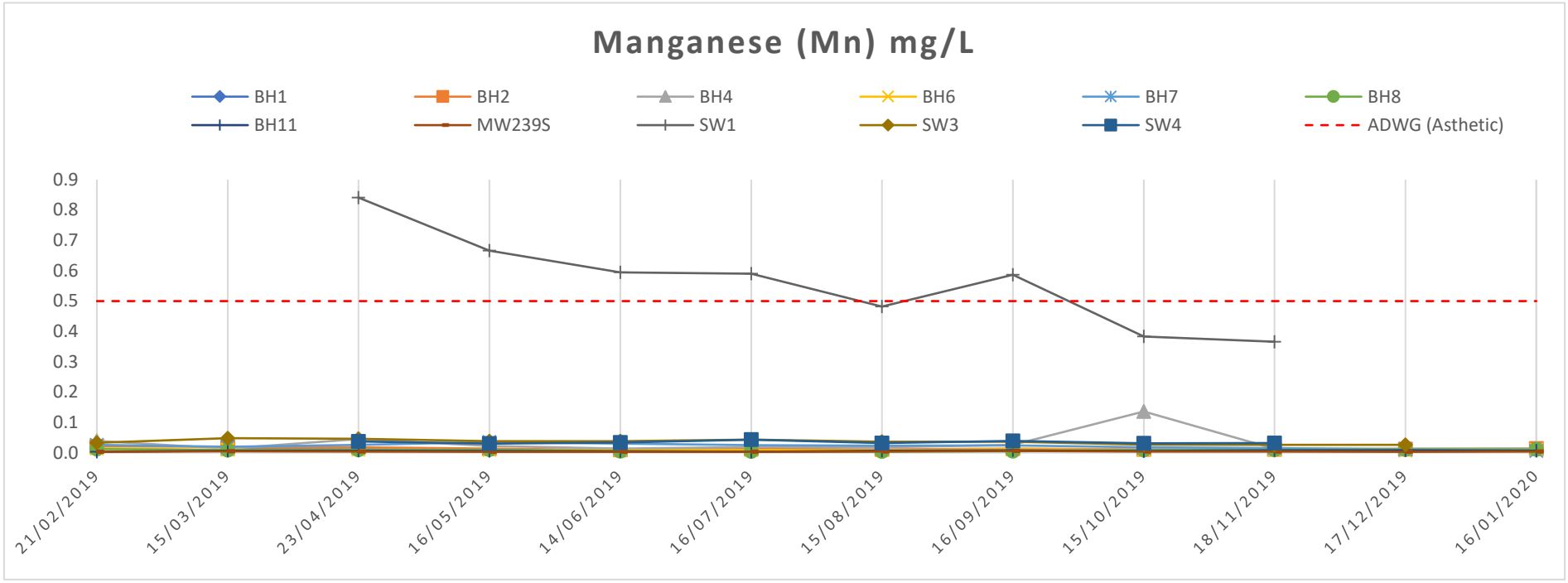

Iron (Fe) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
14
12
10
8.0
6.0
4.0
2.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

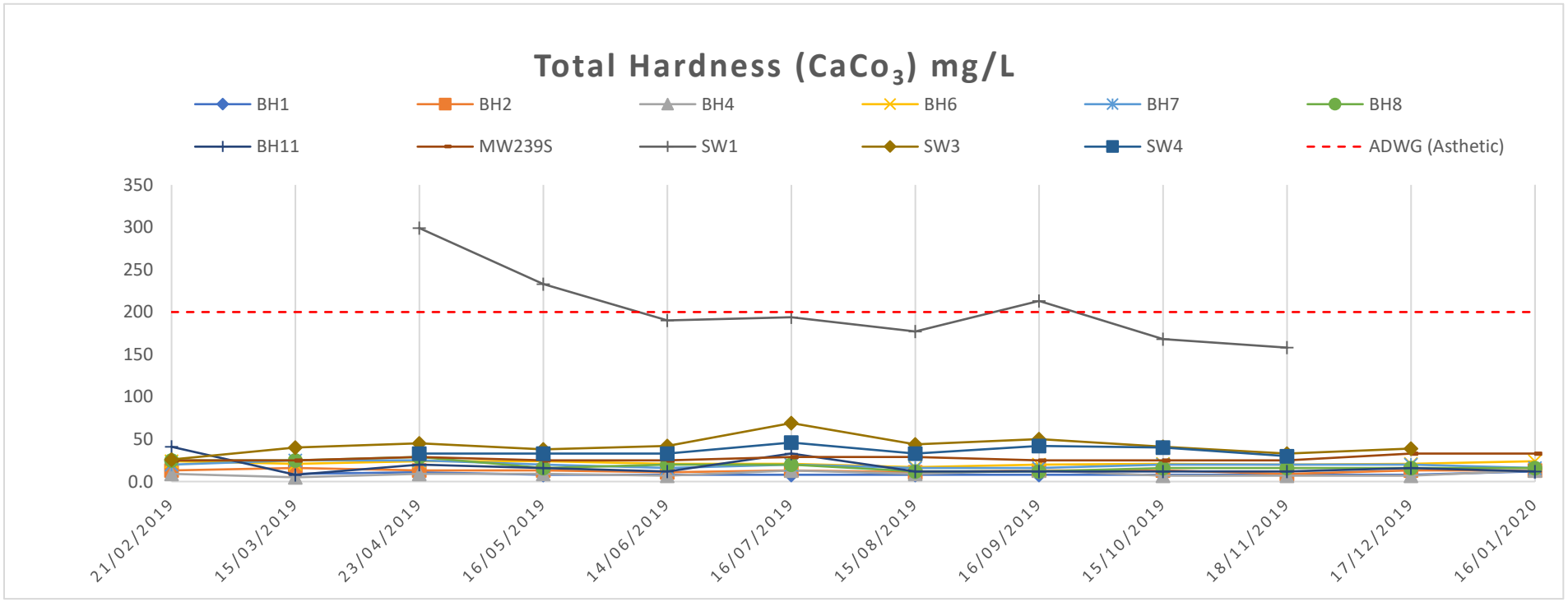

Nickel (Ni) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
ANZECC 2000
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

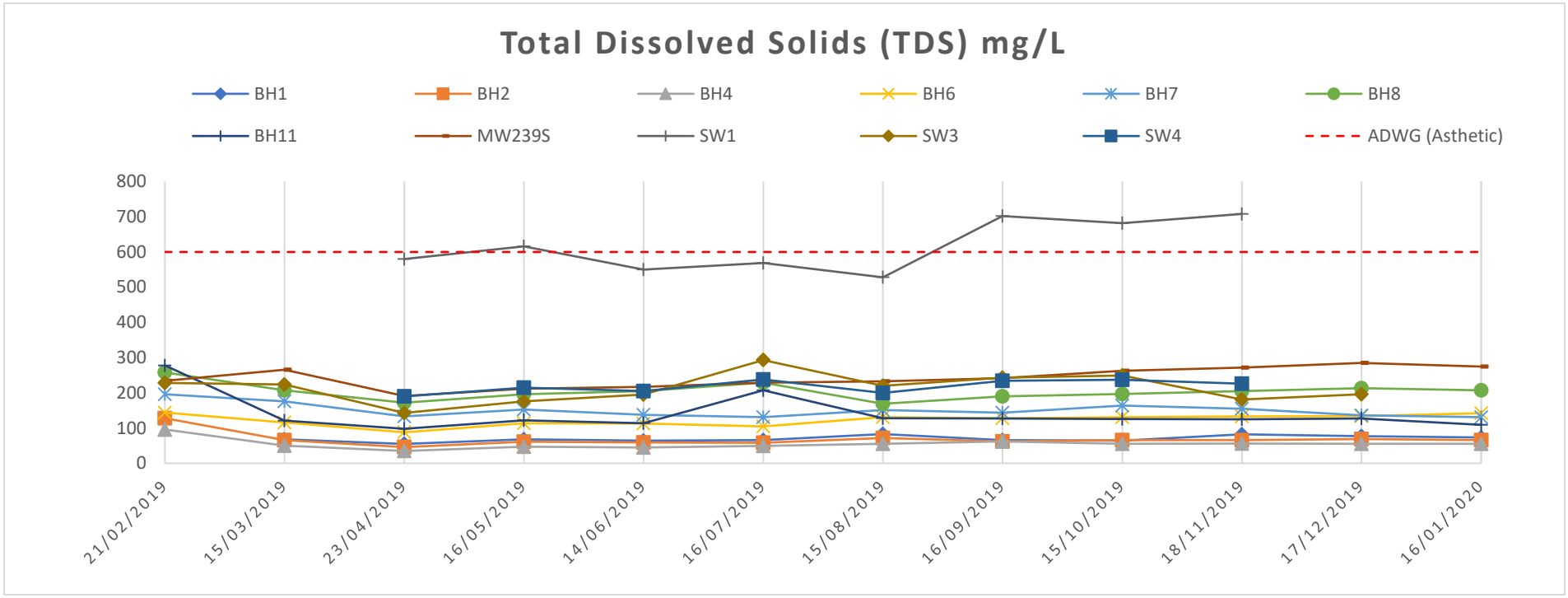

Zinc (Zi) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
1.2
1.0
0.8
0.6
0.4
0.2
0.0
9/01/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

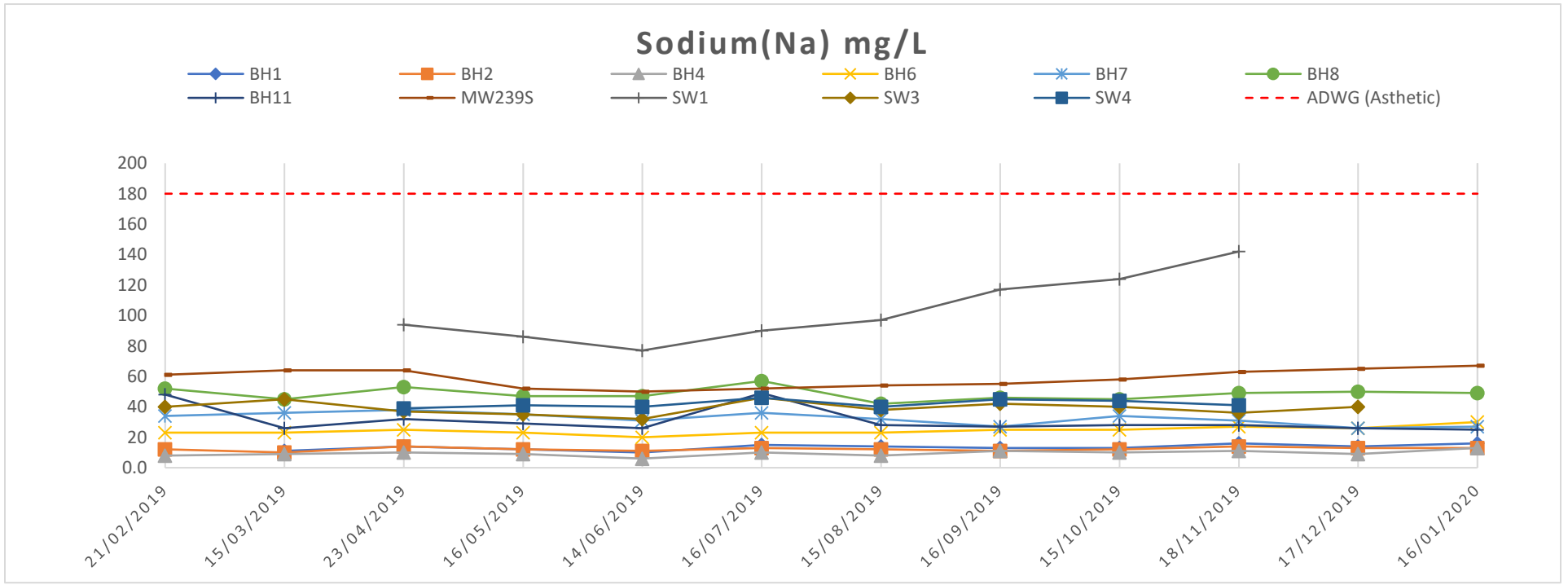

Chromium (Cr) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

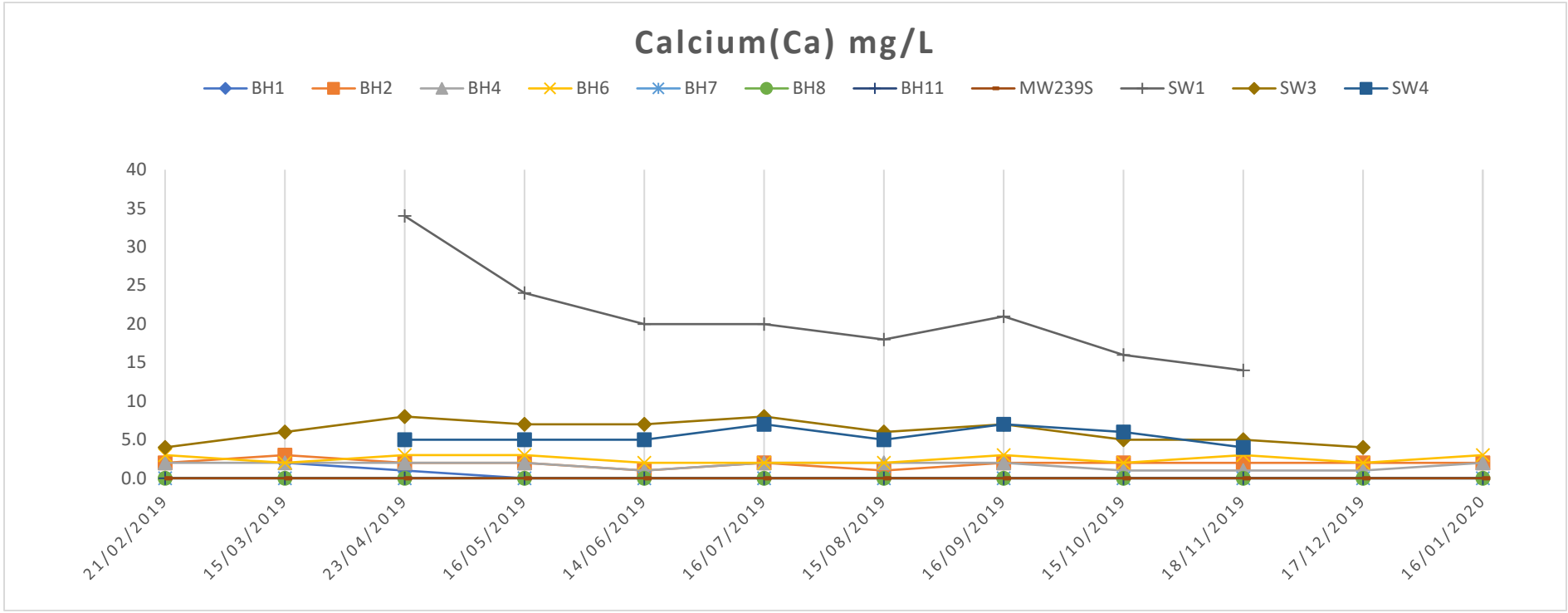

Copper (Cu) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ANZECC 2000
0.06
0.05
0.04
0.03
0.02
0.01
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Manganese (Mn) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Total Hardness ($CaCo_3$) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Total Dissolved Solids (TDS) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
800
700
600
500
400
300
200
100
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Sodium(Na) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
200
180
160
140
120
100
80
60
40
20
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Calcium(Ca) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
40
35
30
25
20
15
10
5.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
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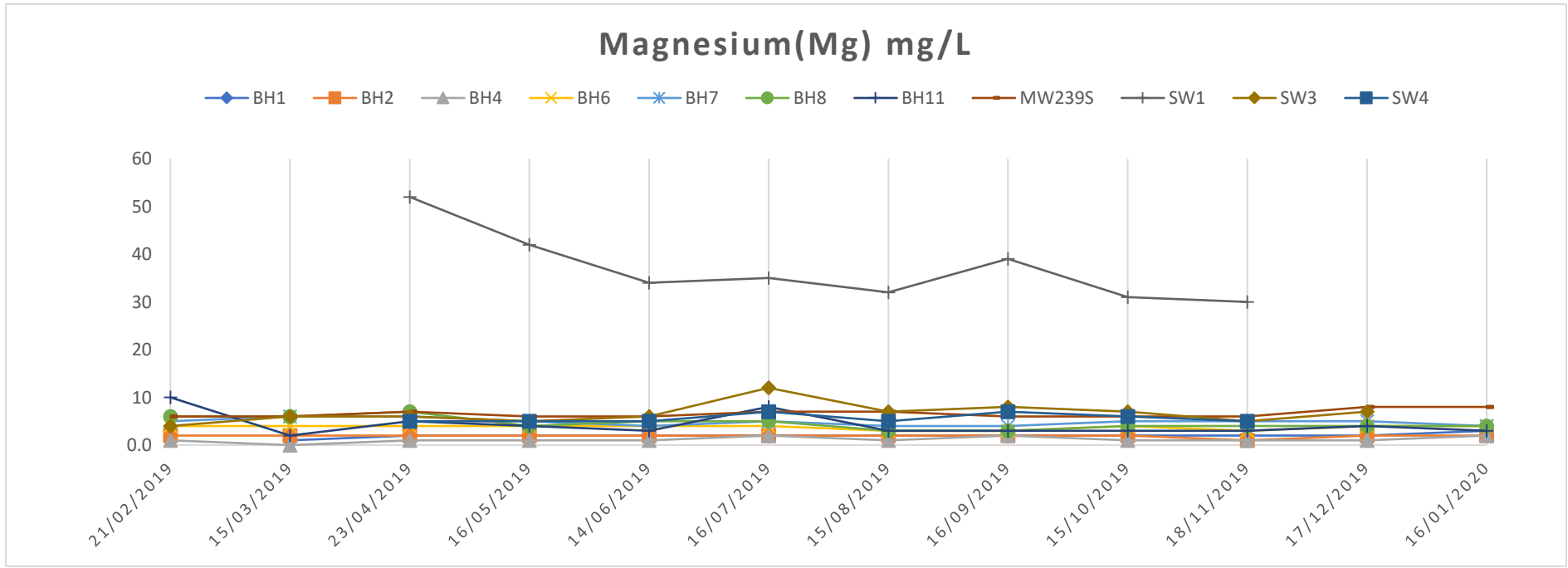
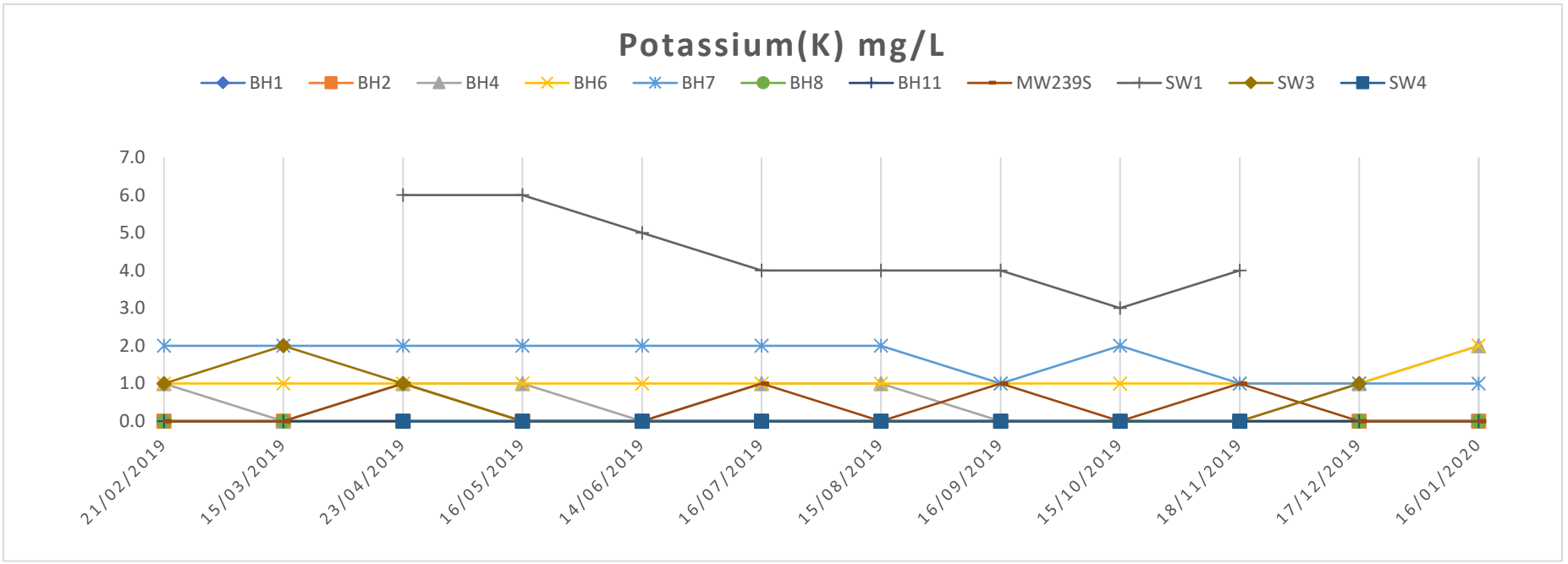
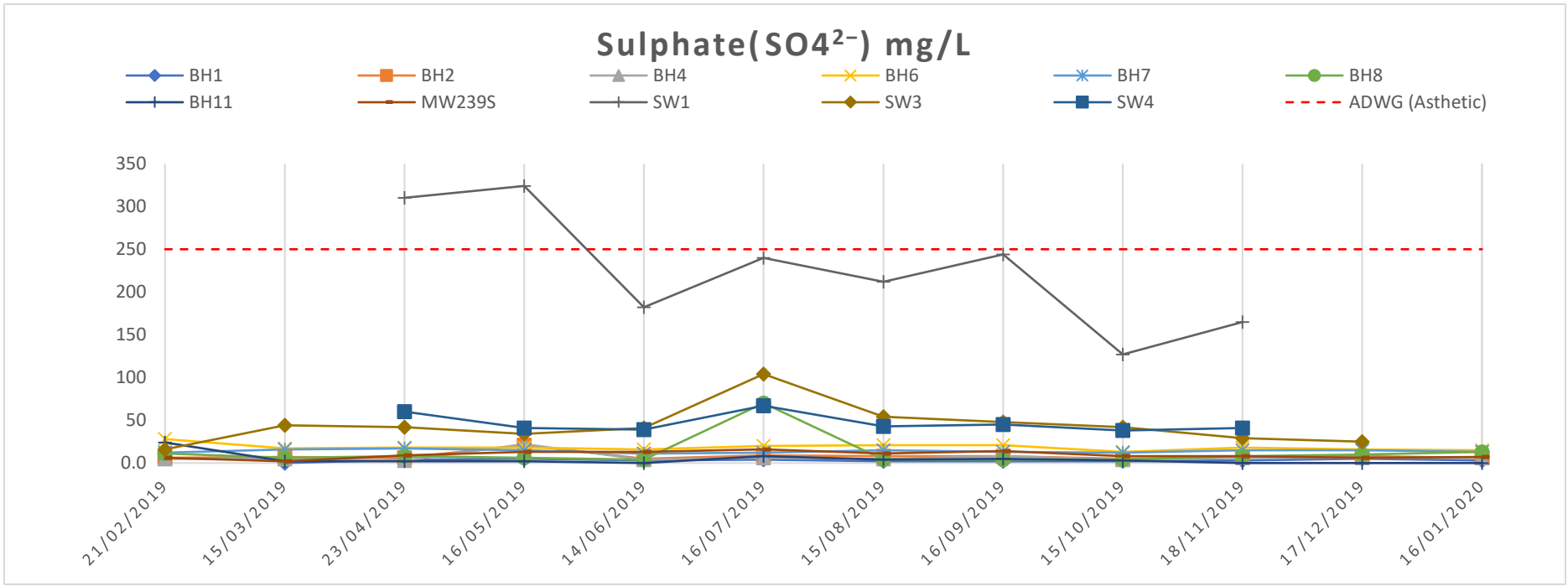
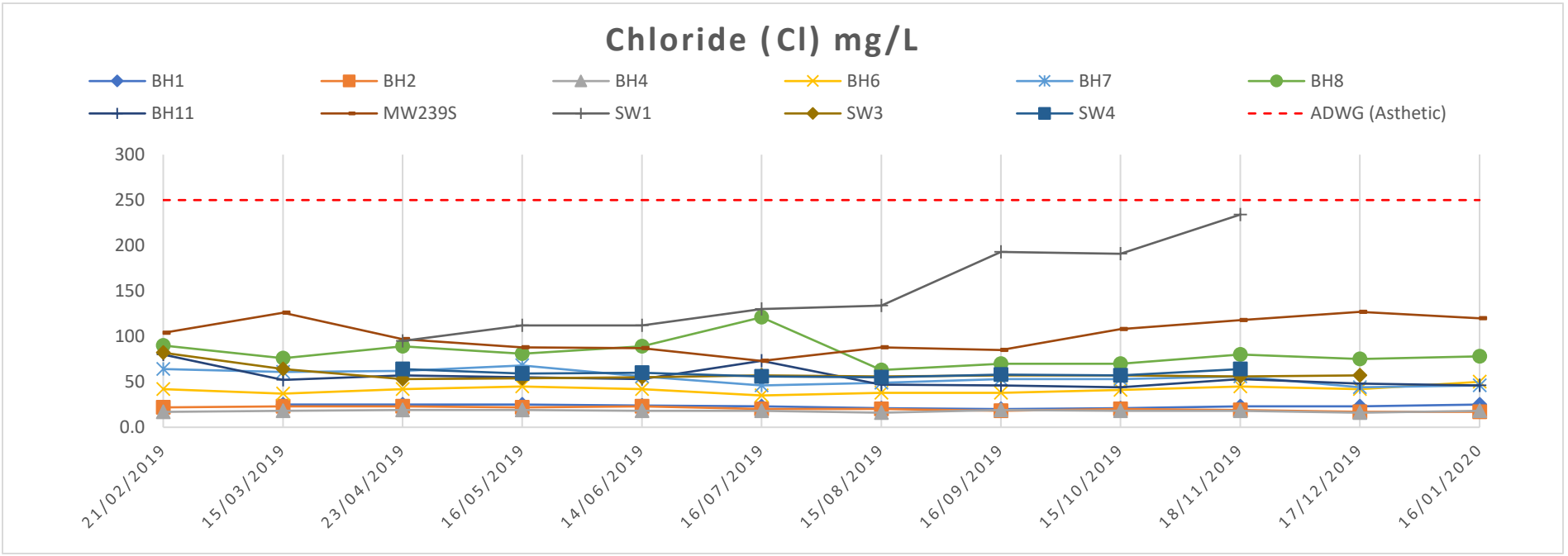
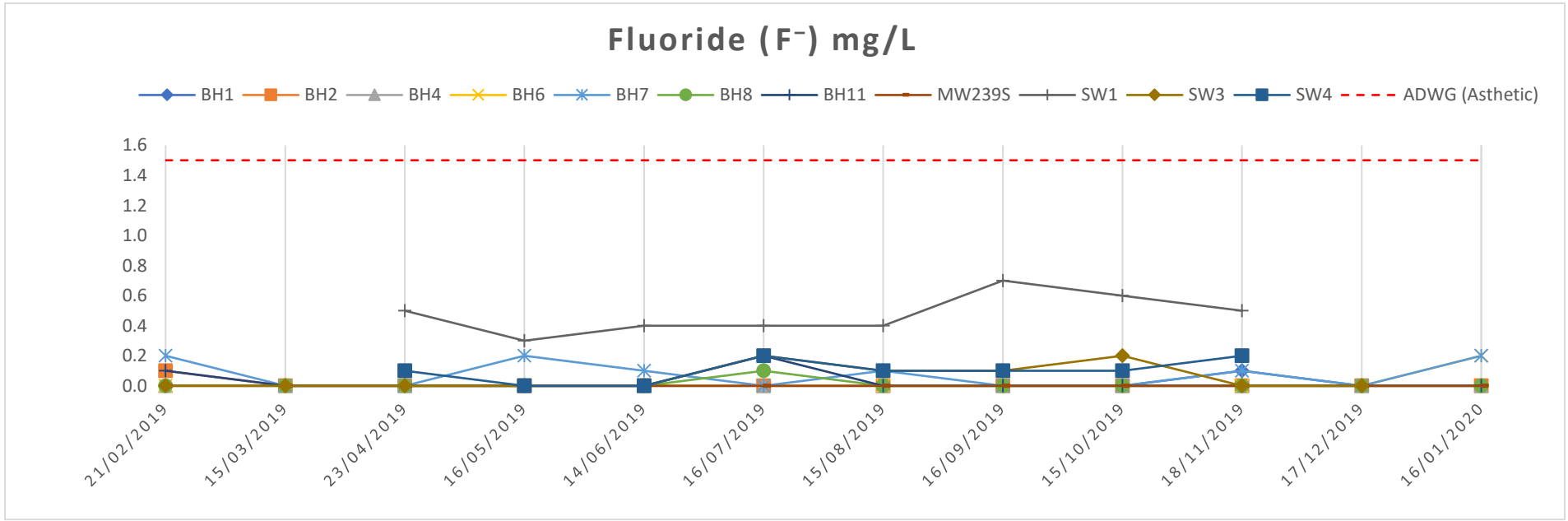
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Magnesium(Mg) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
60
50
40
30
20
10
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Potassium(K) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Sulphate(SO4²⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
350
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Chloride (Cl) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
300
250
200
150
100
50
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020


Fluoride (F⁻) mg/L
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG (Asthetic)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
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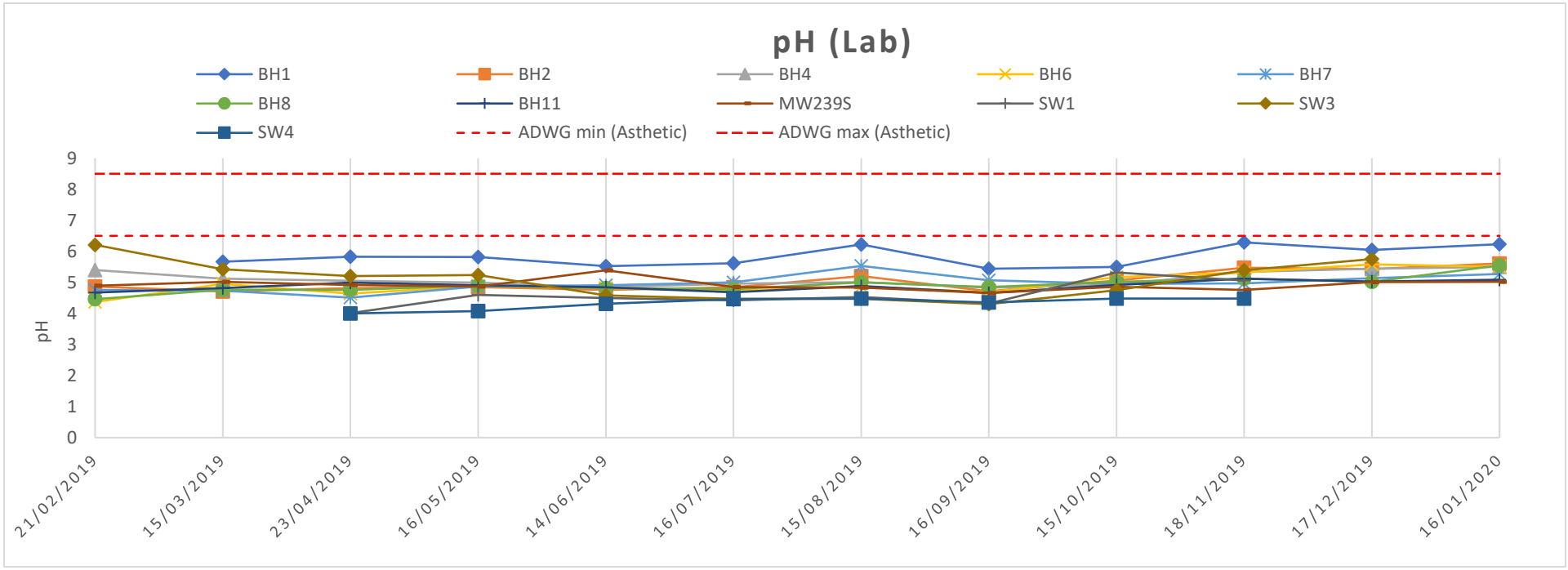
17/12/2019
16/01/2020


pH (Lab)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
pH
9
8
7
6
5
4
3
2
1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
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15/08/2019
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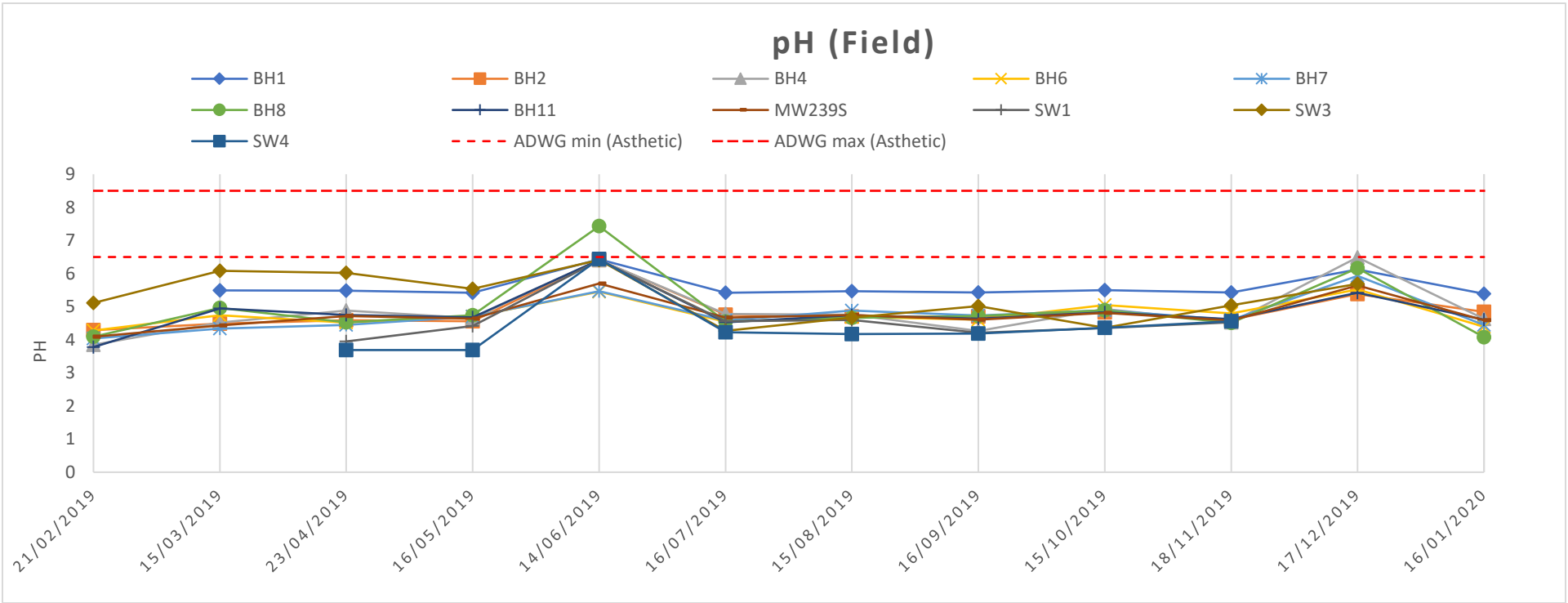
18/11/2019
17/12/2019
16/01/2020


pH (Field)
BH1
BH2
BH4
BH6
BH7
BH8
BH11
MW239S
SW1
SW3
SW4
ADWG min (Asthetic)
ADWG max (Asthetic)
PH
9
8
7
6
5
4
3
2
1
0
21/02/2019
15/03/2019
23/04/2019
16/05/2019
14/06/2019
16/07/2019
15/08/2019
16/09/2019
15/10/2019
18/11/2019
17/12/2019
16/01/2020

APPENDIX 6. RAP INSPECTION RECORDS

RAP Site Inspection Sign Off

This letter provides for the acknowledgement by the Registered Aboriginal Parties (RAPs) that the ground surface as indicated by markup in the plan below has been inspected for the presence of previously unidentified cultural heritage objects.

Table 1: RAP inspection sign on/ off register

RAP	Name	Date Inspected	Time Onsite	Signature
Murrooma	Rebecca Young	23-8-19	Arrive: 8:00 am Leave: 10.30 am	R.Young
Worimi	Jamie Merrick	23/08/19	Arrive: 8:00 Leave: 10:30	
Nurungee	Len Anderson	23/08/19	Arrive: 8 Leave: 1030	
			Arrive: Leave:	

Construction Works Area – August / September 2019

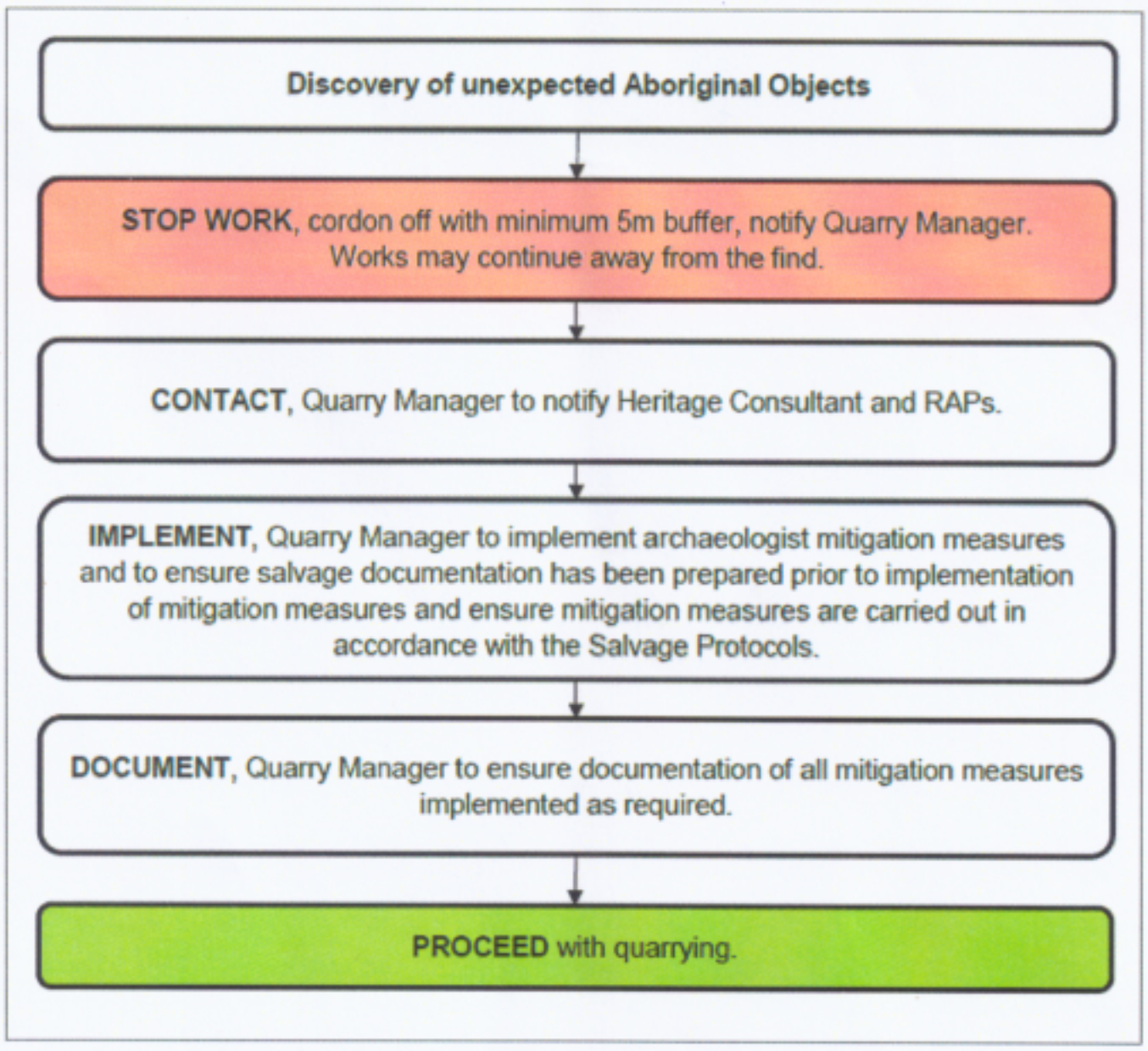
Using a texter or pen please mark on the above plan the areas that were inspected. If identified, please identify the approximate location of any object found, and include a description in the Table 3 below. Please notify the Quarry Manager, who will implement the procedure under the Heritage Management Plan (see next page). As a State Significant Project, artefacts will require recording on the Aboriginal Site Impact Recording Form (ASIRF) and registration in the AHIMS.

Table 2: RAP record of observations

Area Inspected	Objects Found	
	Yes (complete Table 3)	No (area cleared to progress)
All highlighted green area searched - Stage 1		✓ Dy

Table 3: RAP record of observations N/A @ this stage

Location Description	Site Coordinates *(if available)*		Description	Preferred Management *Please initial*
	Easting	Northing		
			As per CHMP → monitoring must be completed for top soil remaval	please contact RAP's



APPENDIX 7. DPIE CORRESPONDANCE

Rob Townsend

From: adam blundell <adamtblundell@gmail.com>
Sent: Wednesday, 25 March 2020 5:01 PM
To: Rob Townsend
Subject: Fwd: Cabbage Tree Rd Sand Quarry - complaint - construction hours

External Email.

Sent from my iPhone

Begin forwarded message:

> **From:** Ann Hagerthy <Ann.Hagerthy@planning.nsw.gov.au>
> **Date:** 18 March 2020 at 3:23:33 pm AEDT
> **To:** Darren Williams <darren@arbus.com.au>
> **Cc:** "adamtblundell@gmail.com" <adamtblundell@gmail.com>, Paul Bourne <Paul@newcastlesand.com.au>, Heidi Watters <Heidi.Watters@Planning.nsw.gov.au>
> **Subject: RE: Cabbage Tree Rd Sand Quarry - complaint - construction hours**
>
> Hi Darren,
>
> Thanks for submitting the information. The Department can confirm that no breach has been identified.
>
> Regards,
>
> **Ann Hagerthy**
> **Senior Compliance Officer**
>
> (Mon-Thu)
> Planning & Assessment - Compliance | Department of Planning, Industry and Environment
> **T** 02 6575 3407 | **M** 0428 976 540| **E** ann.hagerthy@planning.nsw.gov.au
> PO Box 3145 | Singleton NSW 2330
>
> *Please direct all email correspondence to compliance@planning.nsw.gov.au*
>
> www.dpie.nsw.gov.au
>
> *The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.*

From: Darren Williams <darren@newcastlesand.com.au>
Sent: Monday, 20 January 2020 12:48 PM

To: Ann Hagerthy <Ann.Hagerthy@planning.nsw.gov.au>
Cc: adam blundell <adamtblundell@gmail.com>; Paul Bourne <Paul@newcastlesand.com.au>
Subject: RE: Cabbage Tree Rd Sand Quarry - complaint - construction hours

Ann,

Please see the attached response to your email 9.1.20.

As discussed we treat compliance and impact on our neighbours very serious and get good feed back from the vast majority of neighbours who we engage with since being on site, and prior.

The complaint about the pick up on the 27th August 2019 (5 months ago) was raised and addressed at the last CCC meeting see minutes attached.

We would encourage people to contact us promptly should a matter arises so it can be addressed or responded to equally as promptly. In doing so non-events or perceived issues can be eliminated and not compound.

Regards,

Darren Williams
General Manager

NEWCASTLE SAND

Suite 2i Building 9, 54 Clyde Street, Hamilton North NSW 22923
P.O Box 186, Waratah NSW 2298
M 0429 877 704 **E** darren@newcastlesand.com.au
www.newcastlesand.com.au

This message and any attached files may contain information that is confidential and/or subject of legal privilege intended only for use by the intended recipient. If you are not the intended recipient or the person responsible for delivering the message to the intended recipient, be advised that you have received this message in error and that any dissemination, copying or use of this message or attachment is strictly forbidden, as is the disclosure of the information therein. If you have received this message in error please notify the sender immediately and delete the message. Liability limited by a Scheme approved under Professional Standards Legislation.

From: Ann Hagerthy <Ann.Hagerthy@planning.nsw.gov.au>
Sent: Thursday, 9 January 2020 5:27 PM
To: Darren Williams <darren@arbus.com.au>
Cc: adamtblundell@gmail.com; Heidi Watters <Heidi.Watters@Planning.nsw.gov.au>
Subject: Cabbage Tree Rd Sand Quarry - complaint - construction hours

Hi Darren,

The Department received a complaint in relation to construction activities occurring outside approved construction hours, at Cabbage Tree Road Sand Quarry. Can you please provide the following information and records by 20 January 2020:

- Employee and contractor work logs;

- Sign in/out sheets;
- Truck logs;
- Inspection logs; and
- A description of the works undertaken;

to demonstrate all works that occurred on site during the following days:

- Tuesday 27th Aug 5.40am arrival,
- Saturday 7th Sept 3.30pm departure
- Sunday 8th Sept 9.30am arrival, 12pm departure
- Friday 27th Sept, 5.40am arrival
- Sunday 20th Oct working all day depart 5pm
- Saturday 26th Oct arrival 6.15am depart 5.30pm
- Sunday 10th Nov working all morning
- Sunday 17th Nov working all morning

This is an informal request for information and records. You do not have to provide the information or records requested and, if you do so, they may be used in evidence. The Department has powers to require information and records under the Act and may decide to exercise those powers if you do not provide the information and records as requested.

Regards,

Ann Hagerthy
A/Team Leader

(Mon-Thu)
Planning & Assessment - Compliance | Department of Planning, Industry and Environment
T 02 6575 3407 | **M** 0428 976 540| **E** ann.hagerthy@planning.nsw.gov.au
PO Box 3145 | Singleton NSW 2330

Please direct all email correspondence to compliance@planning.nsw.gov.au

www.dpie.nsw.gov.au

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

APPENDIX 8. CONSTRUCTION NOISE MONITORING REPORT

28 February 2020

Ref: 161267/8876

Williamtown Sand Syndicate Pty Ltd
Cabbage Tree Road Sand Quarry
Cabbage Tree Road
WILLIAMTOWN NSW 2318

RE: CONSTRUCTION NOISE MONITORING RESULTS – NEWCASTLE SANDS

This letter report presents the results of plant noise and operational noise compliance monitoring conducted for the Cabbage Tree Road Sand Quarry (CTSQ) at Cabbage Tree Road Williamtown during the period November 2019 – February 2020.

OPERATIONAL NOISE

Noise Limits

Operational noise limits for the quarry are contained in Condition 3, Schedule 3 of Development Consent SSD-6125 issued on 9 May 2018:

Noise Impact Assessment Criteria
The Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)

Receiver	***Day*** $L_{Aeq\ (15\ minute)}$	***Shoulder*** $L_{Aeq\ (15\ minute)}$	***Shoulder*** $L_{Amax\ (1\ minute)}$
Any residence on privately owned land	43	39	45

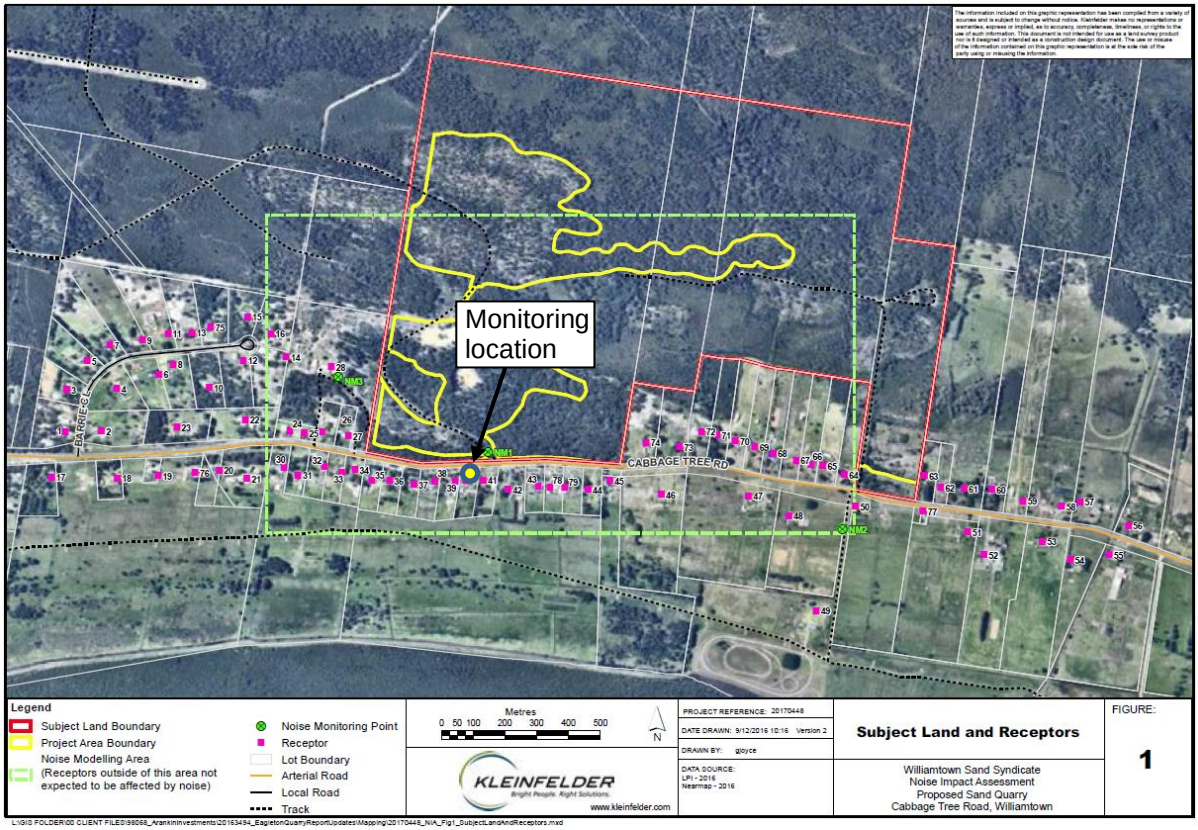
In this condition, 'the development' excludes road construction activities associated with the intersection of the quarry access road and Cabbage Tree Road and vegetation clearing operations within the Southern Resource Area (see condition 4 below).

Noise generated by the development is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NPI. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

The criteria in Table 2 do not apply if the Applicant has an agreement with relevant landowner/s to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Monitoring Locations

Noise monitoring was conducted in the front yard of the residence identified as R40 in **Figure 1**. This location is representative of the potentially worst impacted residences from constructions activities near the site entrance.



Noise Monitoring Procedure

Noise emission levels were measured with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1982 “Sound Level Meters”. Calibration of the instrument was confirmed with a Brüel & Kjær Type 4231 Sound Level Calibrator prior to and at the completion of measurements. A calibration certificate is attached to this report.

Operating conditions

Operation conditions and site activities during the noise surveys have been provided by the operator as follows:

23/11/2019

- Water cart in use.

18/12/2019

- Placing Signs and Posts on Cabbage Tree Road.
- Placing concrete barriers on Cabbage Tree Road.

22/01/2020

- Box out subgrade CH 630-530.
- Completing water main testing.

12/02/2020

- Place DGB 20 on intersection.
- Box out retaining wall footing.

Measured Noise Levels

Table 1 shows summarises the measured noise levels and contributing noise sources.

Table 1. CTSQ Construction Noise Monitoring Results

Location	Date	Time	dB(A), Leq	CTSQ Contribution dB(A), Leq	Criterion dB(A) Leq	Identified Noise Sources
R40	23/11/19	1:04 pm	59	35	43	Traffic (59), **CTSQ (35)**
R40	18/12/19	12:30 pm	61	25	43	Traffic (61), wind (41), **CTSQ (25)**
R40	22/01/20	1:31 PM	62	30	43	Traffic (62), wind (41), **CTSQ (30)**
R40	12/02/20	10:34 AM	68	<30	43	Traffic (68), **CTSQ (<30)**

Noise emission attributed to CTSQ were due to reverse alarms on mobile plant with some contribution from engine revs. The results in Table 1 demonstrate compliance with the noise emission criterion.

I trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276.

Yours faithfully,

SPECTRUM ACOUSTICS PTY LIMITED

Neil Pennington

Acoustical Consultant

B.Sc.(Physics), B.Math.(Hons)
Member, Australian Institute of Physics
Member, Australian Acoustical Society
Member, Acoustical Society of America

Brüel & Kjær

Australian Calibration Laboratory
Suite 2, 6-10 Talavera Road, North Ryde NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

CERTIFICATE OF CALIBRATION

Certificate No: CAU1800652 Page 1 of 10

CALIBRATION OF:

Sound Level Meter:	Bruel & Kjaer	2250	No: 2747794
Microphone:	Bruel & Kjaer	4189	No: 2733511
Preamplifier:	Bruel & Kjaer	ZC-0032	No: 15339
Supplied Calibrator:	N/A	N/A	No: N/A
Software version:	BZ7224 Version 4.6	Pattern Approval:	PTB
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

Spectrum Acoustics Pty Ltd
30 Veronica Street
Cardiff NSW 2285

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 °C
Environment conditions:	*see actual values in **Environmental conditions** sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 7.2 - DB: 7.20) and test procedure 2250-4189.

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 25/06/2018

Sajeeb Tharayil
Calibration Technician

Certificate issued: 26/06/2018

Jan Rasmussen
Approved signatory

Reproduction of the complete certificate is allowed. Part of the certificate may only be reproduced after written permission.

APPENDIX 9. PFAS EXPOSURE PATHWAYS REVIEW

Kleinfelder Australia Pty Ltd
ABN: 23 146 082 500
Level 1, 95 Coventry Street
South Melbourne VIC 3205
T| 03 9907 6000 **F|** 03 9907 6090
www.kleinfelder.com/australia

30 March 2020

20204045.001/Williamtown Sand Syndicate/MLB109272

Williamtown sand Syndicate
PO Box 898
Newcastle, NSW 2300

Attention: Darren Williams

Email: darren@newcastlesand.com.au

Subject: **Williamtown Sand Syndicate – Review of Per- and Polyfluoroalkyl Substances Exposure Pathways**
298 Cabbage Tree Road, Williamtown, New South Wales, 2318

Williamtown Sand Syndicate (WSS) are required to engage an Independent Expert to undertake a review of the available data and determine if quarrying activities are increasing the potential per- and polyfluoroalkyl substances (PFAS) exposure to local residents derived from the Department of Defence (DoD) Williamtown Royal Australian Air Force (RAAF) Base (hereafter "the Base") associated with the Williamtown Sand Syndicate quarry. PFAS have been identified in sediment, surface water, groundwater and biota (terrestrial and aquatic) within and surrounding the Base.

The WSS quarry is located at 298 Cabbage Tree Road, Williamtown (hereafter "the Site") and is situated partially within the New South Wales Environment Protection Authority (EPA) defined Williamtown Management Area (WMA). The Site is located within the WMA *broader management zone* where PFAS may be identified in the future.

This report forms the requirement of Schedule 3 Condition 48 in Development Consent SSD-6125 which requires an assessment of whether or not quarrying operations are increasing the risk of PFAS exposure for local residents and/or the environment.

Since 2007 the DoD have been investigating the PFAS presence in various media at and surrounding the Base. The investigations have included multiple rounds of soil, sediment, surface water and groundwater sampling within the EPA defined Williamtown Management Area.

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Additional off-Base PFAS surface water and groundwater fate and transport models and human and ecological health risk assessments have also been conducted. The human health risk assessment[1] identified four "risk zones" designated as Zones A through D and corresponding with a risk hierarchy such that Zone A is the highest risk and Zone D is the lowest. Part of the Site is situated within the low risk zone C, with the northeastern Site area located outside the defined risk zones.

A review of the available information that includes the Site setting, PFAS sampling and analysis undertaken at the Site and investigations conducted by the DoD at the base and surrounding area leads to the following conclusions:

- PFAS are not present in Site soil, surface water or groundwater.
- PFAS migration from primary or secondary Base sources are unlikely to result in PFAS migrating to the Site.
- The proposed quarry minimum extraction elevations are sufficiently above the maximum observed local water table and comply with conditions set out in the quarry's licence.

The DoD-commissioned human health risk assessment determined that the Site is within risk zone C for PFAS impacts originating from the Base. The risk assessment review compared the upper exposure scenario (i.e., highest concentration) for risk zone C with potential exposures from the quarry and concluded:

- Quarrying operations will not increase the PFAS risk to residents because:
    - PFAS have not been identified in the tested Site media and are unlikely to impact nearby residents at unacceptable levels.
    - The Base PFAS groundwater plumes will not intersect the eastern Site boundary prior to 2050.
    - Quarrying operations may result in the establishment of a groundwater mound; however this is unlikely to change the current groundwater flow regime.

Historical prevailing wind directions and dust mitigation measures undertaken by the quarry will not result in additional PFAS impacts to nearby residents.

[1] AECOM, 2017. Off-site Human Health Risk Assessment. RAAF Base Williamtown, Stage 2B Environmental Investigation

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1 INTRODUCTION

As per Schedule 3 Clause 48 of the consent, WSS commissioned a suitably qualified and experienced Independent Expert to undertake a review of DoD and the NSW EPA information regarding PFAS contamination that originated from the Williamtown Royal Australian Air Force (RAAF) Base ("the Base").

Currently in the construction phase, WSS are preparing to extract sand from the "Site", which is within the NSW EPA declared WMA. The WMA was established by the NSW EPA following DoD commissioned testing of sediment, soil, groundwater, surface water and aquatic and terrestrial biota which identified a large area affected by PFAS contamination originally sourced from the Base (Figure 1). The management area is comprised of three zones:

- Primary – high PFAS concentrations have been observed.
- Secondary – low PFAS concentrations have been identified.
- Broader – topography and hydrology are used to suggest that PFAS could be identified in the future.

The Site is within the broader management area where the Site's eastern boundary is 1.4 km from the Base's western boundary.

In accordance with Schedule 3 Condition 48 of the Consent an annual review of the current available PFAS information relating to PFAS exposure pathways for contamination originating from the Base is required to be conducted. The review is to assess if the quarrying activities have resulted in an increased PFAS exposure for local residents. Condition 48 states the following:

> *"In conjunction with preparation of each Annual Review, unless otherwise agreed with the Secretary, the Applicant shall engage a suitably qualified and experienced independent expert, approved by the Secretary, to review the currently available information on exposure pathways for PFAS contamination originating from the Williamtown RAAF Base, as may be applicable to local residents and the development. This report must assess whether or not quarrying operations are increasing the risk of PFAS exposure for local residents and/or the environment, to the satisfaction of the Secretary. The Applicant must ensure that the Review of PFAS Exposure Pathways reports are placed on its website and are available to the CCC and any interested person on request*."

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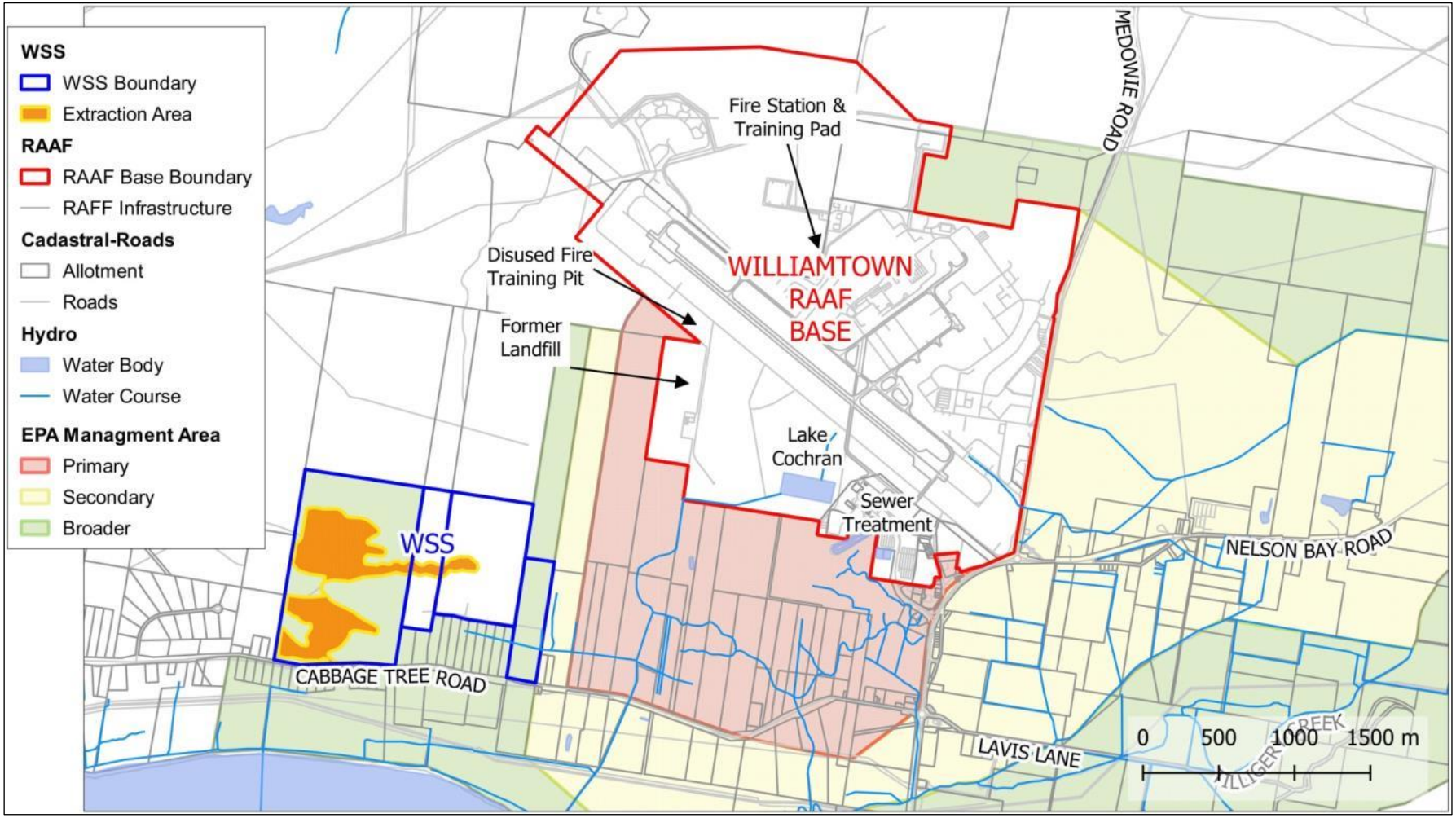

Figure 1. Site regional context

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2 OBJECTIVE

The objective of this review is to assess if the quarrying activities during the 2019 calendar year have resulted in an increased PFAS exposure for local residents.

3 SITE SETTING

The site is located approximately 1.4 km to the southwest of the Base's western boundary. The general land use in the vicinity of the Site is large-lot residential and farming. Residential properties are located to the Site's west and south with larger allotments located along the eastern and northern boundaries. The Tilligerry Habitat Reserve forms part of the western and northern Site boundaries.

The Williamtown area receives a mean annual rainfall of 1,100 mm, with the highest rainfall months typically between January and June, where the mean rainfall typically exceeds 100 mm. Mean monthly temperatures range between 17°C and 28°C, indicating the climate is warm temperate. The prevailing 9 AM wind directions at the Base[2] are northwesterly (25%) and westerly (22%), i.e., away from the Site. Calm is the third most common observation (15%). Wind directions toward the Site are northeasterly (6%) and easterly (5%). Predominant 3 PM wind directions are southeasterly (24%) and southerly (16%). Afternoon wind directions toward the Site are easterly (14%) and northeasterly (8%).

Geologically the Site is located within the Tomago Sandbeds, a linear series of shallow sand dunes that cover approximately 200 km^2 between Newcastle and Lemon Tree Passage, that have a mean thickness of 20 metres. The beds were deposited from the Hunter and Karuah rivers during a period of high sea level and overlie relatively impermeable clays and rocks. The hydraulic gradient indicates a potential southerly groundwater flow direction (**Figure 2**) and in some low lying areas the water table is at the surface.

The Tomago Sandbed is an aquifer which forms an important potable water resource in the area. The potable groundwater combined with relatively shallow water table depth (mean depth 1.5 m below ground level) in the area have, historically resulted in the extensive use of the resource as a stock watering, irrigation and drinking water supply.

[2] Bureau of Meteorology wind speed and direction data for site number 061078 (Williamtown RAAF). Data are for 9 AM with 26,178 observations and 3 PM with 26,153 observation.

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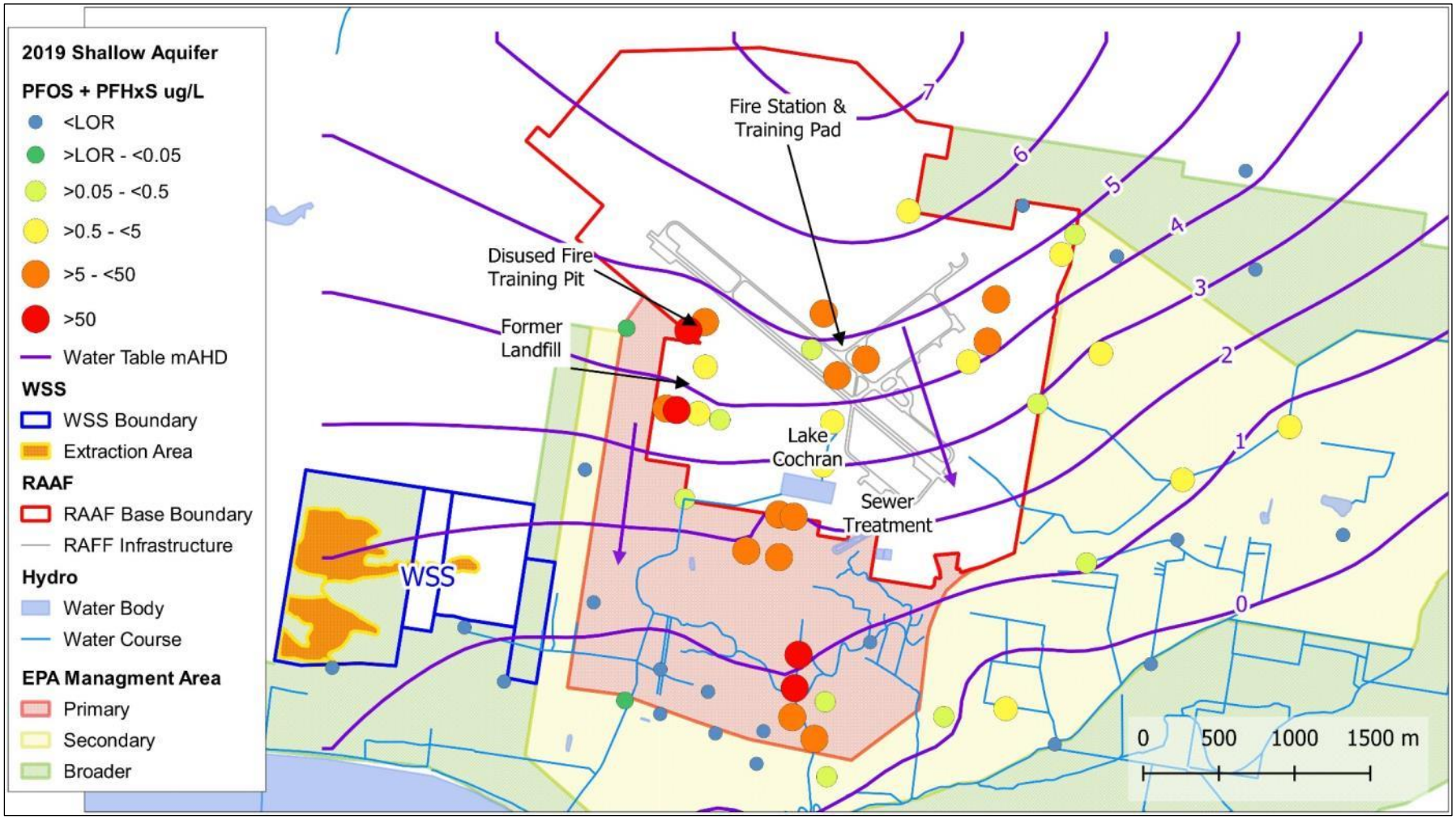

Figure 2. May 2019 water table elevations, potential groundwater flow direction and shallow groundwater sample PFOS + PFHxS concentrations

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There is a well-developed man-made surface waterway network within the Williamtown area. Site surface water runoff may discharge to two unnamed surface water channels; one channel discharges directly to Fullerton Cove and the other joins Dawsons Drain, approximately 650 metres from the Site's eastern boundary. Within the Base Lake Cochran acts as a stormwater collection point which also discharges to the off-Base Dawsons Drain And ultimately Fullerton Cove.

4 2019 QUARRYING ACTIVITIES SUMMARY

During the reporting period the activity was in the construction phase, with no sand being processed or transported from site. Excavation of sand occurred for construction purposes only, with some temporary stockpiling of excavated material for future re-use. Construction commenced on 14 August 2019.

The quarry occupies four land titles and has an area of 175 hectares (ha), with the extractable sand resource occupying 43 ha. Approximately 3.25 megatonnes of sand will be quarried from elevated areas over a period of 15 years. Sand will be excavated from an elevation of 24 mAHD to an elevation no less than 0.7 metres above the highest estimated water table elevation. The anticipated minimum excavation elevations are 3.8 mAHD in the north and 3.4 mAHD in the south.

Groundwater is not being extracted by the site operators for quarrying operations, which rely on water sourced from Hunter Water. WSS have commenced a comprehensive groundwater and surface water monitoring program to assist with potential migration of PFAS from the Site and to ensure that sand is not extracted from an elevation less than 0.7 metres above the maximum water table elevation.

Works that occurred during 2019 at the Site include:

- Construction of onsite facilities and the intersection with Cabbage Tree Road
- Minor vegetation removal and temporary stockpiling of excavated material associated with the construction of the intersection and site facilities.
- No sand was processed or exported from the Site.

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5 SUMMARY OF PFAS INVESTIGATIONS IN THE WMA

5.1 On- and Off-Base PFAS Investigations

PFAS contamination of surface water, groundwater, sediment and aquatic and terrestrial biota within and surrounding the Base has been reported by both the NSW EPA and DoD. A list of reports is available at www.defence.gov.au/environment/pfas/Williamtown/publications.asp.

The contamination is understood to have been the result of the use of aqueous film-forming foam utilised in firefighting and emergency response training activities. The known PFAS contamination sources at the Base are:

- Primary sources – Fire station, two landfills and a disused fire training pit.
- Secondary sources – Lake Cochran, the trade waste treatment plant (eastern Base area) and sewage treatment plant.
    - The trade waste treatment plant is not considered a possible source for PFAS contamination at the Site.

The surface soil samples collected outside the Base boundaries[3] have been predominantly collected across the southern boundary, south of Lake Cochran and the sewerage treatment area. The sum of PFOS and PFHxS[4], which generally make up approximately 90% of the PFAS identified in the Williamtown Management Area, in the off-Base surface soil samples PFOS and PFHxS range between the laboratory limit of reporting (LOR) of 0.2 micrograms per kilogram (µg/kg) and 375 µg/kg. Two soil samples were collected between the Site and the Base's western boundary. The PFOS + PFHxS concentrations in soil were 0.5 and 0.7 µg/kg, with the closest sample to the Site 350 metres northeast (1.3 km from the disused fire training pit (i.e., a primary PFAS source) and 1.1 km from a former landfill (i.e., a secondary PFAS source).

PFOS + PFHxS concentrations above the laboratory LOR (>0.2 to <10 µg/L) have been observed in all surface water samples collected from channels that receive discharge from the Base. Based on the local drainage network, surface water is not considered a likely pathway for PFAS from the Base to the Site.

[3] AECOM, 2017. Environmental Site Assessment. RAAF Base Williamtown, Stage 2B Environmental Investigation.
[4] PFOS – perfluorooctane sulfonic acid; PFHxS – perfluorohexane sulfonic acid

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On- and off-Base PFAS groundwater investigations have focussed on the Tomago Sandbed aquifer with shallow and deep groundwater samples collected and analysed. This review focusses on PFAS concentrations in the shallow aquifer, which is the aquifer section that could be intersected during quarrying.

The 2019 groundwater PFAS monitoring results of the Base are summarised in **Figure 2**. PFOS + PFHxS concentrations above the laboratory LOR were detected to the south of Lake Cochran, beneath the disused fire training pit, former landfill and current fire station and training pad. From the data reviewed it is evident that there is a groundwater mound to the south of Lake Cochran, suggesting the lake is providing groundwater recharge and consistent with high PFOS + PFHxS concentrations observed down-gradient from the Lake.

The Site is not directly down-hydraulic gradient from any known primary or secondary PFAS source.

With regards to the Base a groundwater fate and transport model four “unidentified” PFAS sources (surface water, soil and or groundwater) located to the Site’s south were identified. It is likely that one of these sources, located near the Cabbage Tree Road Dawsons Drain bridge is associated with the Lake Cochran discharge. The three other low PFAS concentration occurrences are located to the Base’s south and cannot be directly linked to the source at the Base. The three locations are:

- One Base groundwater monitoring well and three residential monitoring bores located on Cabbage Tree Road, directly south of the Site.
- Groundwater from a residential well located 550 metres to the Site’s south.
- Groundwater from a residential bore located to the south of lot DP629503. It is noted PFAS were not present above the laboratory LOR in a 2019 groundwater sample (from MW139) located approximately 75 metres up-hydraulic gradient from the residential well.

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The PFAS groundwater fate and transport model[5] estimated:

- The Base PFAS groundwater plume areas may expand through PFAS dispersion and diffusion.
- That by 2050:
    - The disused fire training pit and former landfill plumes may merge, although the merged plume should not intersect the Site's eastern boundary.
    - The Lake Cochran PFAS plume should not intersect the Site's eastern boundary.
- The probable Lake Cochran sourced off-Base groundwater "unidentified" PFAS occurrence is beneath the Site's DP814078 parcel (eastern Site area) at concentrations between 0.01 and 0.07 µg/L.

6 SITE PFAS AND WATER TABLE INVESTIGATIONS

PFAS investigations commissioned by WSS at the Site have involved submission of soil, surface water and groundwater samples to a laboratory that has National Association of Testing Authorities (NATA) accreditation to determine PFAS concentrations in the submitted media.

6.1 Soil

Sixteen samples collected from 10 bore holes between 7 and 17 December 2016 were submitted for PFAS analysis. The samples were all collected from elevated Site areas where sand quarrying is proposed to be undertaken. All samples, including two samples collected within the eastern Site area, i.e., closest to the Base were reported to have total PFAS concentrations below the laboratory LOR.

6.2 Surface Water

Eleven surface water samples collected from three locations between February and November 2019 were submitted for PFAS analysis.

[5] Hydro Simulations, 2016. RAAF Williamtown groundwater modelling. Appendix L of AECOM, 2016. Stage 2B environmental investigation report. RAAF Base Williamtown. (www.defence.gov.au/Environment/PFAS/docs/Williamtown/Reports/ESAReports)

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PFOS concentrations, below the National Medical Research Council (NHMRC) drinking water criteria of 0.07 µg/L were reported in two surface water samples (0.03 and 0.05 µg/L (LOR = 0.01 µg/L)) collected from SW04 in September 2019. SW04 is located at the Site's southeast corner of the eastern-most land parcel (DP814078), above the "unidentified" groundwater PFAS source. PFAS were reported below the laboratory LOR in an earlier sample collected from the same location in May 2019 and a follow up sample collected in November 2019.

The presence of PFAS in the Site surface water is therefore unable to be confirmed but is considered unlikely.

6.3 Groundwater

Twelve groundwater monitoring bores have been installed and sampled at the Site (BH01 to BH12). MW239S, located on Cabbage Tree Road directly to the Site's south and installed during the DoD investigations was reported to have 0.03 µg/L PFOS in March 2017 and was re-sampled during the February 2019 groundwater monitoring event. Two Site bores have been dry since 2017 (BH09 and BH10) and one bore was decommissioned in September 2019 (BH03).

May 2019 water table elevations for on-Site bores are provided on **Figure 3**, where it is evident that there is a close correspondence to the AECOM May 2019 measured water table elevations. At the Site May 2019 water table elevation varied between 1.2 mAHD in the south and 3.3 mAHD in the north, with a south to southeasterly groundwater flow direction and a low hydraulic gradient (MW04 to MW11 = 0.002[6]).

Depth to groundwater observations between February 2019 and January 2020 show that the water table elevation beneath the Site reduced by a mean of 0.7 m (ranging from 0.2 to 1.1 m). During the monitoring period the maximum water table elevation was 0.9 m above the proposed quarrying base in the north (3.8 mAHD; BH01 maximum water table elevation = 2.9 mAHD) and 1.9 m above the proposed base in the south (3.4 mAHD; BH04 maximum water table elevation = 1.5 mAHD). These maximum water table elevations are greater than 0.7 m below the proposed quarry base.

[6] Hydraulic gradient units are internally consistent units (m), which cancel during the calculation

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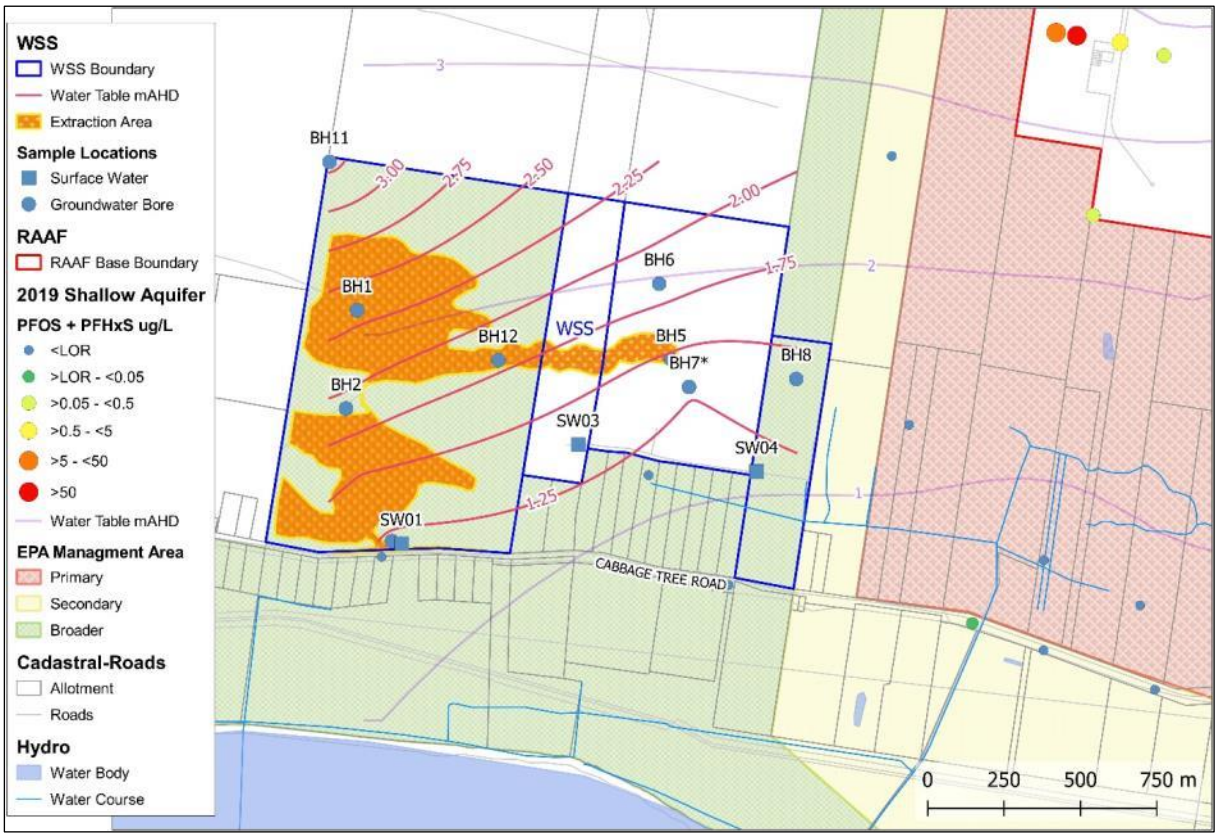

Figure 3. Site water table elevations and surface water and groundwater PHOS + PFHxS concentrations

Groundwater rainfall recharge within the sands is likely to be relatively rapid. The removal of sand above the Site aquifer is likely to produce a groundwater mound, due to increased infiltration and lower evapotranspiration although the mound will likely dissipate in the short-term due to the high effective porosity of the sands. If a groundwater mound does form beneath the quarried areas it would be unlikely to significantly change the groundwater flow direction and is more likely to result in producing a steeper off-Site hydraulic gradient. The likelihood that the quarrying would lead a change in groundwater flow direction and increased groundwater flow from the Base to the Site area is very low.

Seven groundwater samples were analysed for PFAS in 2016 and 2017 with all PFAS reported below the laboratory LOR. Between February 2019 and January 2020 groundwater samples from nine monitoring wells, eight on-Site and one off-Site (total = 54) were submitted to the laboratory for PFAS concentration determination (**Table 1**).

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Table 1. PFAS Concentration in Groundwater 2019.

Monitoring Event Date	Monitoring Well ID	Total PFAS	PFAS >LOR, µg/L
21-22 Feb 2019	BH02, BH03, BH04, BH05, BH06, BH07, BH08, BH11 & MW239S	<LOR	-
14-15 Mar 2019	BH04, BH06, BH07, BH08	<LOR	-
23 Apr 2019		<LOR	-
16 May 2019		<LOR	-
14 Jun 2019		<LOR	-
16 Jul 2019		<LOR	-
15 Aug 2019		<LOR	-
16 Sept 2019		<LOR, except BH04	PFDS[7], 0.02
25 Sept 2019	BH04	<LOR	
15 Oct 2019	BH04, BH06, BH07, BH08	<LOR	
18 Nov 2019		<LOR	
17 Dec 2019		<LOR, except BH04	6:2 FTS[8], 0.19
16 Jan 2010		<LOR	-

Concentrations were below LOR with the exception of BH04 in September and December 2019 The groundwater monitoring well BH04 is located in the southern Site area, near the DoD documented occurrence in off-Site residential groundwater wells and down hydraulic gradient from the WSS 2019 works area. BH06 to BH08 are located within the eastern Site area, closest to the Base which, although unlikely could in the future be impacted by PFAS migration in groundwater.

The PFAS reported above the laboratory LOR were:

- A PFDS concentration (0.02 µg/L, LOR = 0.02 µg/L) was reported in groundwater from BH04 collected on 16t September 2019, confirmation sampling on the 25 September 2019 for PFAS returned results below the laboratory LOR.
- A 6:2 FTS concentration (0.19 µg/L, LOR = 0.05 µg/L) was reported in groundwater collected from BH06 in December 2019, Confirmation sampling in January 2020 for PFAS returned results below the laboratory LOR.
    - 6:2 FTS was not reported above the laboratory LOR in shallow groundwater samples during the 2019 DoD monitoring.

[7] PFDS is perfluorodecanesulfonic acid
[8] 6:2 FTS is 6:2 fluorotelomer sulfonic acid

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96% of the Site groundwater PFAS analyses during 2019 and early 2020 were reported below the laboratory LOR. In the two cases where concentrations above the LOR were reported the compound concentrations were close to the LOR and not repeated during confirmation sampling or not observed in the DoD PFAS plumes. In addition, the PFAS concentration reported slightly above the laboratory LOR from the shallow aquifer in the Site area[9] in 2017 was below the laboratory LOR upon resampling in 2019.

7 DOD HUMAN HEALTH RISK ASSESSMENT REVIEW

The DoD engaged AECOM to undertake an off-site human health risk assessment (HHRA) in 2016 which was updated in 2017[10]. A summary of the findings of the updated HHRA and relevance to the Site area are provided below.

The HHRA evaluated the potential health risks in the Williamtown area to residents (including recreational and commercial fishers and beef farmers) and non-residents (commercial fishers, council workers and visitors) from exposure to PFAS under both typical and upper exposure scenarios. The exposure scenarios are:

- Typical exposure scenario – Representative of PFAS concentrations that a general or average receptor is likely to be exposed. Applicable to the majority of the population.
- Upper exposure scenario – Calculated based on the upper 95th percentile of PFAS concentrations in the relevant media and is applicable for receptors that may be in close proximity to media with elevated concentrations within a localised area, such as a residential groundwater well. The upper exposure scenario is considered sufficient for quarry workers who would be exposed to a generally high risks though ingestion (incidental and through inhalation) or residents near the quarry.

Based on the Stage 2B investigation outcomes the HHRA[11] divided the off-Base areas into *zones* based on the potential risk that PFAS posed. The Site's local area was designated risk zone C (low risk), with the risk zone encompassing the entire eastern Site area and the southern proposed extraction area. For reference the northern extraction area is not within an identified risk zone.

[9] MW236S, AECOM 2017.
[10] AECOM, 2017. Off-site Human Health Risk Assessment. RAAF Base Williamtown, Stage 2B Environmental Investigation.
[11] AECOM, 2017. Off-site human health risk assessment. December 2017. RAAF Base Williamtown. Stage 2B environmental investigation. (www.defence.gov.au/Environment/PFAS/docs/Williamtown/Reports)

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The HHRA determined risks for risk zone C upper exposure scenarios (pathways) are:

- Ingestion and contact with groundwater – acceptable.
- Dermal contact with soil and Ingestion of soil and dust – acceptable.
- Consumption of homegrown eggs – **elevated**.
- Consumption of locally grown fruit and vegetables – acceptable.
- Incidental ingestion of surface water – **elevated**.
- Surface water contact – acceptable.
- Incidental ingestion and contact with sediment – acceptable.
- Consumption of beef and milk – **elevated**.

7.1 Relevance to Potential On- and Off-Site Exposures

The HHRA determined potential exposure pathways listed above are considered suitable for off-Site residents and on-Site quarry personnel. For nearby residents and quarry personnel the comparison of the HHRA upper exposure scenario is considered conservative:

- For dust inhalation/soil ingestion because:
    - The prevailing wind directions in the area are not toward the residential areas.
    - PFAS have not been identified in shallow (or deep) soil samples.
    - Dust mitigation measures are required during quarrying activities.
- For groundwater exposure because:
    - The quarry base will not extend to a depth closer than 0.7 metres to the highest estimated water table elevation, hence groundwater management will not be required and discharge to surface water will not occur.
    - PFAS have not been identified above the laboratory LOR in Site groundwater, hence PFAS present in nearby residential groundwater wells is unlikely to have been sourced from the Site and may be diluted by Site derived groundwater.
    - The designation of risk zone C in the Site area was partially based on a very low PFOS concentration from one well, a concentration that was not subsequently repeated.

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- Groundwater migration from the Base is unlikely to reach the eastern property before 2050, by which time quarrying operations will have ceased and any complete PFAS migration pathways will be unlikely.

- For surface water because:

  - PFAS were not present above the laboratory LOR in surface water samples that drain from the Site.

The potential increased PFAS exposure to residents from quarrying activities is therefore considered unlikely.

8 CONCLUSIONS

This report has reviewed the currently available information regarding the PFAS contamination originating from the Base and assessed Site derived groundwater data to determine whether quarrying operations will increase the PFAS exposure to nearby residents.

During 2019 activities at the Site were largely restricted to vegetation removal and building and roadway construction. Quarrying operations were not undertaken during 2019.

Considering the information reviewed the following is concluded:

- Base-sourced PFAS is, and has historically been unlikely to be transported to the Site via wind, surface water or groundwater – the Site does not appear to have received PFAS from the Base and does not appear to be acting as a local tertiary PFAS source because:

  - PFAS have not been reported within Site media (shallow and deep soil, surface water and groundwater) which is consistent with the results from the investigation undertaken by the DoD.

- Quarrying has not been performed and has not increased the potential for contaminated groundwater to flow toward the Site's local area. The most probable effect of quarrying will be the formation of a temporary groundwater mound due to increased rainwater infiltration and decreased evapotranspiration, with the local groundwater flow regime unlikely to be influenced for an extended time-period. The influence of quarrying on the groundwater flow regime is expected to decrease the risk of Base derived PFAS.

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9 RECOMMENDATION

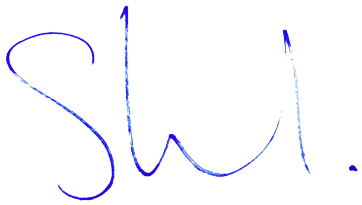
Developing a numerical groundwater flow model that allows for the effects of increased infiltration in the sand extraction areas to be quantitatively assessed should be considered.

If you require additional information or clarification, please contact the undersigned at (03) 9907 6000.

This report should be read in conjunction with the Kleinfelder Statement of Limitations (attached).

Sincerely,

Kleinfelder Australia Pty Ltd



Stuart Graham (PhD – Geochemistry)

Associate Hydrogeologist

Attachment 1: Kleinfelder Statement of Limitations

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ATTACHMENT 1: KLEINFELDER STATEMENT OF LIMITATIONS

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