Appendix C – Groundwater and Surface Water Monitoring Event July 2017

NSW Health Infrastructure

New Maitland Hospital

Groundwater and Surface Water Monitoring Event July 2017

March 2018

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Abbreviations

ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ALS	ALS Environmental
ANZECC	Australia and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWQG	Australian Water Quality Guidelines
bgl	Below ground level
BOM	Bureau of Meteorology
BTEX	Benzene, toluene, ethyl benzene and xylenes
BTOC	Below top of casing (well casing)
COC	Chain of Custody
DO	Dissolved Oxygen
EC	Electrical Conductivity
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
ESL	Ecological Screening Level
GIL	Groundwater Investigation Level
GMRRW	Guidelines for Managing Risk in Recreational Waters
HIL	Health Investigation Level (relating to defined land use scenario)
HI	NSW Health Infrastructure
HSE	Health Safety and Environment
HSL	Health Screening Level
L	Litre
LOR	Laboratory limit of reporting
µg/L	Micrograms per litre
µS/cm	Micro-Siemens per centimetre
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NATA	National Association of Testing Authorities of Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NMH	New Maitland Hospital
NSW EPA	New South Wales Environmental Protection Authority

NSW DEC	(Former) New South Wales Department of Environment and Conservation
OEH	Office of Environment and Heritage
PAH	Polycyclic aromatic hydrocarbons
pH	-log[H]
QA/QC	Quality assurance/quality control
Redox	Reduction-oxidation potential
RPD	Relative percentage difference
SWL	Standing water level
TEQ	Toxicity equivalent quotient (in reference to BaP)
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
USEPA	United States Environmental Protection Agency

1. Introduction

GHD Pty Ltd (GHD) was engaged by NSW Health Infrastructure (HI) to undertake groundwater and surface water monitoring for Lot 7314 DP 1162607, Metford Road, Metford, NSW. Lot 7314 is referred to as the 'site' for convenience in this report, and is the proposed development area for the New Maitland Hospital (formerly referred to as the 'Stage 1'). The site, as defined for the purpose of this report, forms a portion of the overall development area for the health services facility. The overall area (formerly the CSR/PGH clay mine/brick works) is being investigated in stages that may not necessarily correspond to subsequent development activities.

The location of the overall development area (red boundary) and the boundary of Lot 7314 (yellow northern and eastern boundaries) are shown in Figure 1 in Appendix A.

A Phase 2 Environmental Site Assessment (ESA) of Lot 7314 was prepared by GHD in December 2015. No significant contamination was found at the site, however natural carbonaceous material was present, isolated instances of potential asbestos-containing material (PACM) were identified, with numerous areas of anthropogenic wastes and the potential for "unexpected finds" of contamination to occur during earth works. The ESA concluded that the investigation works undertaken have sufficiently characterised the site to enable an assessment of its suitability for the proposed purpose (hospital with open space grounds), subject to implementation of a soil management plan.

Similar investigations were undertaken for Lot 266 DP 755237 (east of Lot 7314, formerly referred to as 'Stage 2') in 2016 (draft report issued July 2016) and included surface water sampling locations, some of which were adopted into this monitoring event.

This report outlines the results of groundwater and surface water monitoring conducted at the site in July 2017.

1.1 Objectives

The objective of monitoring was to confirm current groundwater and surface water conditions at the site.

1.2 Scope of works

The scope of work involved the following general tasks:

- Preparation of Health Safety and Environment (HSE) documentation for the investigations.
- Gauging and sampling of 16 groundwater monitoring wells.
- Collection of five surface water samples (and one sediment sample in lieu of surface water).
- Laboratory analysis of water chemistry attributes, and contaminants of potential concern, listed in Section 2.5.
- Comparison of current monitoring results with previous investigations (October 2015 and June 2016) and against adopted assessment criteria.
- Assessment and reporting.

2. Fieldwork

2.1 Groundwater

Groundwater samples were collected 4-7 July 2017 from groundwater monitoring wells MW6, MW61, MW62, MW63, MW64, MW201, MW204, MW205, MW400D, MW401, MW402, MW403D, MW403S, MW404D, and MW404S. MW400S was gauged but was dry.

The groundwater monitoring well locations are shown in the figures in Appendix A. Well construction details (from previous investigations) are shown in Table 2-1. Wells MW61-MW64, MW201, MW204 and MW205 were installed by DLA Environmental Services, and details of construction were not made available to GHD.

Table 2-1 Groundwater monitoring well construction details

Bore ID	Easting	Northing	Total depth (m bgl)	Screened Interval (m bgl)	Aquifer Geology	Top of Casing (m AHD)	Ground Level (m AHD)
MW6	369317.081	6374598.202	-	-	-	-	-
MW61	-	-	-	-	-	-	-
MW62	-	-	-	-	-	-	-
MW63	-	-	-	-	-	-	-
MW64	-	-	-	-	-	-	-
MW201	-	-	-	-	-	-	-
MW204	-	-	-	-	-	-	-
MW205	-	-	-	-	-	-	-
MW400D	369303.108	6374598.202	18.0	12 to 18	Sandstone	19.17	18.55
MW400S	369304.147	6374632.674	6.3	1.2 to 5.9	Sandstone/ Coal/ Siltstone	19.28	18.26
MW401	369654.882	6374412.327	12.0	7.0 to 11.5	Claystone/ Shale/ Sandstone	9.00	8.31
MW402	369588.524	6374314.167	11.0	4.4 to 10.4	Siltstone/ Shale/ Claystone/ Coal/ Sandstone	10.42	9.81
MW403D	368987.526	6374343.840	22.8	16.8 to 22.8	Sandstone/ Siltstone/ Coal/ Shale	21.72	21.11
MW403S	368986.635	6374344.103	8.0	5.0 to 8.0	Claystone/ Siltstone/ Shale/ Coal	21.55	21.06
MW404D	369513.479	6374553.664	9.4	6.0 to 9.0	Claystone	8.65	8.13
MW404S	369512.830	6374553.330	1.0	0.4 to 0.9	Claystone	8.83	8.10

m AHD: metres Australian Height Datum

m bgl: metres below ground level

The standing groundwater level at each bore was measured immediately prior to sampling using an Interface Meter (Geotech Environmental Equipment Inc.). The bore depth, was measured at the time of monitoring. Groundwater samples were collected using a low flow MicroPurge Pump (QED Environmental Systems) that was decontaminated using Decon Neutracon solution between each sampling event to prevent cross contamination of samples. Water temperature, pH, electrical conductivity (EC), reduction-oxidation (redox) potential, and dissolved oxygen (DO) were measured in the field using a YSI ProPlus Water Quality Meter. Samples were collected once field parameters had stabilised. The YSI ProPlus and Interface Meter were initially calibrated by the supplier, and the YSI ProPlus was thereafter calibrated by GHD team members at the commencement of each day of monitoring.

Low flow groundwater sampling techniques have been utilised for the current (and previous) monitoring round to obtain a representative groundwater sample by reducing disturbance within the bore and also to reduce the volume of purged groundwater.

Low flow groundwater sampling involves controlling the velocity with which water enters the pump intake within the screened interval of the bore, so that most of the water pumped will be drawn in directly from the surrounding aquifer with little mixing of stagnant bore water or disturbance to the sampling zone. The optimum pumping rate was determined in the field by regular monitoring of the water level in the bore during pumping to ensure minimal drawdown.

2.2 Surface water

Surface water samples were collected by immersing an unpreserved sample container directly into the waterbody to several centimetres below the surface (with the aid of a reach pole if required) and transferring the samples into appropriately labelled and preserved laboratory-supplied sample containers.

Water temperature, pH, electrical conductivity (EC), reduction-oxidation (redox) potential, and dissolved oxygen (DO) were measured in the field (at the time of sampling) using a YSI ProPlus Water Quality Meter .

In lieu of surface water sample SW403, which was practically dry (the former dam at this location had been drained), a sediment grab sample was collected at this location (SED01) directly by hand (wearing a new/clean pair of disposable nitrile gloves).

2.3 Sample logistics

Samples were placed directly into appropriately preserved laboratory supplied containers and stored in a chilled insulated container during sampling and transport to the laboratory. Water samples collected for analysis of metals were filtered in the field. Details of the laboratory analytical suite are provided in Section 2.5. As part of the quality assurance program, samples were transported to ALS Environmental (ALS) Sydney under chain of custody conditions.

2.4 Field Quality Assurance / Quality Control

All samples were collected in a manner consistent with the collection, handling and preservation principles enunciated in *Standards Association of Australia (1998) AS/NZ 5667.1:1998*, and *American Public Health Association (APHA 1998) section 1060*.

Pump bladders, tubing and disposable equipment used for groundwater sampling was dedicated and disposed of after sampling. Reusable equipment was decontaminated as described in Section 2.1. A new/clean pair of disposable nitrile gloves were used when handling each sample.

2.5 Laboratory analysis

Laboratory analysis was carried out by ALS, Sydney, which is a NATA (National Association of Testing Authorities) accredited laboratory for the required analytical testing. The laboratory analytical documentation is presented in Appendix C.

For the July 2017 monitoring event, groundwater and surface water samples were analysed for:

- Major cations – calcium, magnesium, potassium and sodium.
- Major anions – alkalinity as $CaCO_3$, chloride, sulfate and fluoride.
- Dissolved metals– arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel and zinc.
- Total petroleum hydrocarbons (TPH).
- Benzene, toluene, ethylbenzene and xylenes (BTEX).
- Ultra trace polycyclic aromatic hydrocarbons (PAHs).

The listed analytes (except major cations and anions, which are used to assess connectivity of waters) were adopted to test for potential contaminants of concern for the site.

3. Assessment criteria

The adopted assessment criteria (discussed below) are presented in the results summary tables in Appendix B.

The overarching guideline used in this assessment was the National Environment Protection (Assessment of Site Contamination) Measure (referred to here as the NEPM), produced by the federal National Environmental Protection Council (NEPC) in 1999, and revised and updated in 2013 by way of the National Environmental Protection (Assessment of site Contamination) Amendment Measure 2013.

3.1 Water

Site assessment should consider the risks from contaminated surface water and groundwater to all potential receptors on and off the site of origin and potential effects on groundwater resources and receiving waters. The groundwater investigation levels (GILs) from the NEPM are based on the *Australian Water Quality Guidelines* (ANZECC 2000) (AWQG), the *Australian Drinking Water Guidelines* (NHMRC 2011) (ADWG), and the *Guidelines for Managing Risk in Recreational Waters* 2008 (GMRRW). The GILs are adopted in the NEPM as investigation levels in the context of the framework for risk-based assessment of groundwater contamination i.e. levels above which further assessment is required.

The AWQG provides tabulated values based on percentage species protection for various aquatic environments and water uses. The appropriate settings for current and potential uses of groundwater need to be identified for the aquifer undergoing assessment. The guideline documents should be consulted for appropriate interpretation of guideline values, in consultation with relevant regulatory authorities if necessary.

The GILs define acceptable water quality for various contaminants at the point of use and provide frequently used values for drinking water and protection of fresh water ecosystems. The GMRRW recommend applying a multiplication factor of 10 to 20 to the ADWG for assessment of the acceptability of recreational water quality. GILs for other receptors should be obtained directly from the 'primary industries' section of the AWQG where relevant. Note that the recreational and aesthetics sections of the AWQG have been superseded by the GMRRW.

3.2 Soil assessment criteria

The NEPM includes a range of ecological investigation and screening levels, health investigation levels and health screening levels for a range of contaminants and for a range of land use and exposure scenarios. The selection of the assessment criteria has been based on the proposed site development and land use as a health services facility, including a hospital, as discussed in detail in previous GHD investigations.

Where investigation levels are not presented in the NEPM, the USEPA regional screening levels and CRC Care Technical Report 10 were used i.e. for CoPC associated with brick manufacturing (barium and fluoride) and for direct contact (respectively).

4. Results

4.1 Weather observations

No rain fell over the site in the 24 hours prior to the sampling event; and no rain fell during the days of sampling. Rainfall data was obtained from the Bureau of Meteorology weather station located at Maitland Airport (Station No. 061428). The maximum average temperature on the three sampling days was 25.2C. Strong winds were recorded at Maitland Airport weather station (max 72km/hr) however only light winds were experienced on site during sampling.

4.2 Groundwater observations

Groundwater levels (measured in the field) are listed in Table 4-1.

Table 4-1 Groundwater levels – July 2017

Bore	Top of Bore Casing Elevation (m AHD)	Ground Level (m AHD)	Total Bore Depth (m bgl)	Date Measured	Ground-water Depth (m btoc)	Ground-water Depth (m bgl)	Ground-water Elevation (m AHD)
MW6	-	-	16.24	5/7/2017	12.89	12.29	-
MW61	-	-	-	7/7/2017	11.72	11.47	-
MW62	-	-	22.70	5/7/2017	11.32	10.70	-
MW63	-	-	14.91	5/7/2017	7.89	7.29	-
MW64	-	-	11.43	5/7/2017	3.25	2.55	-
MW201	-	-	10.88	4/7/2017	3.38	2.78	-
MW204	-	-	6.81	4/7/2017	2.93	2.25	-
MW205	-	-	10.75	5/7/2017	1.24	0.64	-
MW400D	19.17	18.55	18.54	5/7/2017	12.19	11.62	6.98
MW400S	19.28	18.26	6.23	5/7/2017	Dry	-	-
MW401	9.00	8.31	12.06	4/7/2017	1.92	1.27	7.08
MW402	10.42	9.81	10.83	5/7/2017	2.69	2.09	7.73
MW403D	21.72	21.11	22.22	4/7/2017	6.17	5.49	15.55
MW403S	21.55	21.06	8.62	4/7/2017	2.68	1.98	18.88
MW404D	8.65	8.13	9.60	6/7/2017	0.55	0.05	8.10
MW404S	8.83	8.10	1.58	6/7/2017	0.97	0.47	7.86

Notes:

m btoc: metres below top of casing

m bgl: metres below ground level

Groundwater field parameters and observations are presented in Table 4-2.

4.1 Hydrograph

A hydrograph was prepared using available standing water level data for each of the groundwater monitoring wells including data from DLA monitoring provided by HI, plotted against historical rainfall data. The hydrograph is presented in Figure 4-1.

Table 4-2 Groundwater field parameters and observations

Bore	Date	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)	Temperature (°C)	Purge Volume (L)	Field Observations
MW6	5/07/2017	0.3	4926	6.11	-7	19.6	2.0	Clear, colourless, no odour or sheen
MW61	7/07/2017	0.2	1142	5.05	157	19.8	3.6	Clear, colourless, no odour or sheen
MW62	5/07/2017	0.1	2113	5.79	130	19.5	2.0	Clear, colourless, no odour or sheen
MW63	5/07/2017	0.9	5601	4.47	280	20.3	2.5	Clear, colourless, no odour or sheen
MW64	5/07/2017	1.0	4943	5.36	131	21.1	3.8	Slightly turbid brown
MW201	4/07/2017	1.0	636	4.10	418	19.5	2.0	Clear, colourless, no odour or sheen
MW204	4/07/2017	0.2	2426	5.98	108	20.6	2.0	light brown, slightly turbid
MW205	5/07/2017	3.2	5139	7.02	352	17.7	2.4	Clear, colourless, no odour or sheen
MW400D	5/07/2017	0.4	4866	6.16	67	19.9	2.2	Clear, colourless, no odour or sheen
MW400S	5/07/2017	-	-	-	-	-	-	Dry
MW401	4/07/2017	5.1	8522	5.35	322	19.8	3.3	Clear, colourless, no odour or sheen
MW402	5/07/2017	0.5	10462	5.95	62	19.3	2.1	Slightly turbid brown
MW403D	4/07/2017	0.7	11451	3.93	365	19.5	2.1	light brown/red, solid floating particles visible
MW403S	4/07/2017	0.6	12596	3.71	299	18.9	5.0	Clear, colourless, no odour or sheen
MW404D	6/07/2017	5.0	4887	6.09	304	16.5	2.2	Clear, colourless, no odour or sheen
MW404S	6/07/2017	-	-	-	-	-	-	Brown, med. turbidity. Insufficient water for field measurements

Groundwater quality parameters measured during the July 2017 sampling event are summarised below:

- pH measurements ranged between 3.71 (MW403S) and 7.05 (MW205) indicating slightly to moderately acidic conditions.
- EC measurements ranged between 636 µS/cm (MW201) and 12596 µS/cm (MW403S) indicating fresh to moderately saline water conditions.
- Redox measurements ranged between -7.5 mV (MW6) and 418.2 mV (MW201) indicating relatively oxidising conditions.
- DO measurements ranged between 0.09 mg/L (MW62) and 4.97 mg/L (MW404D).
- Temperature measurements ranged between 16.5°C (MW404D) and 21.1°C (MW64).

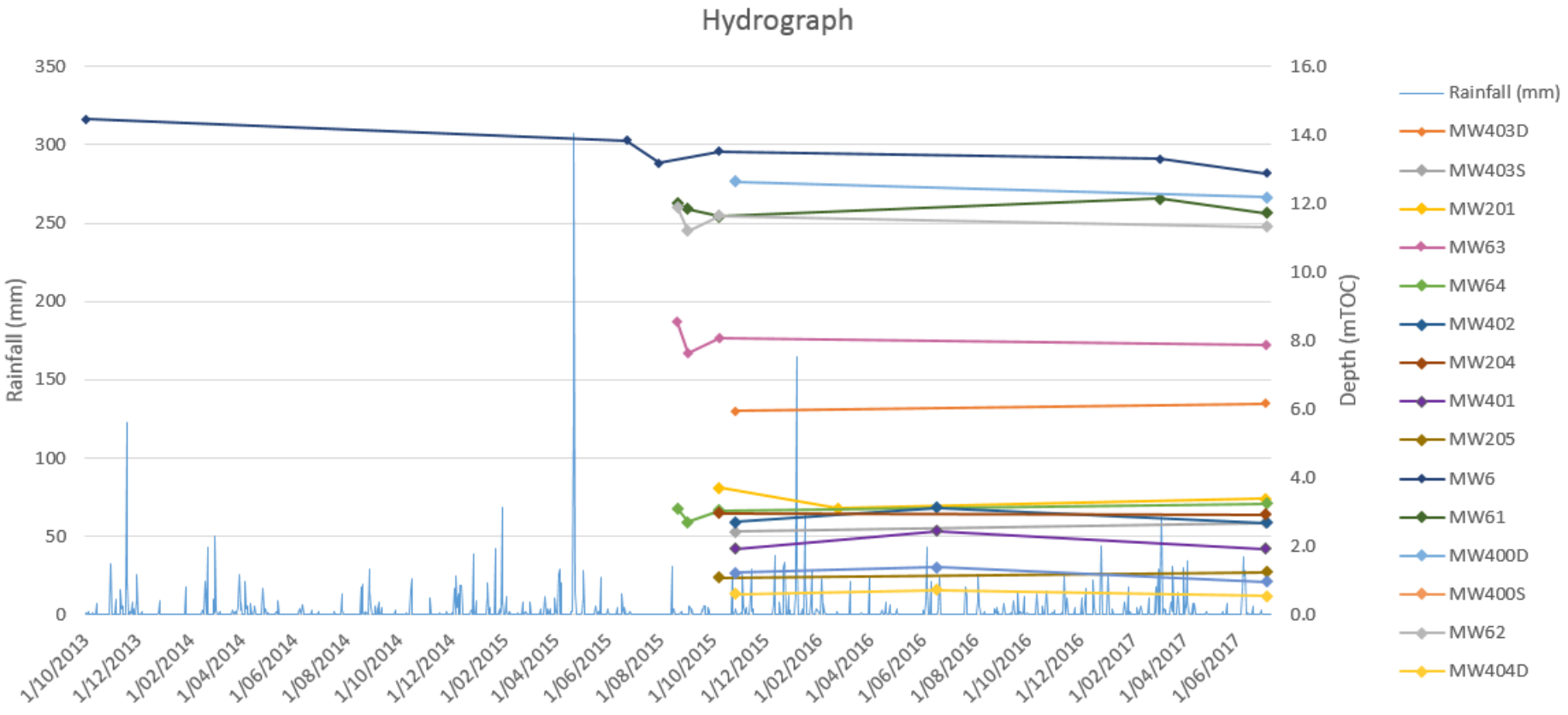

Figure 4-1 Hydrograph

4.2 Surface water observations

Surface water field parameters and observations are presented in Table 1 Appendix B.

Surface water quality parameters measured in the field during the July 2017 sampling event are summarised below:

- pH measurements ranged between 5.20 (SW402) and 7.17 (SW403) indicating slightly acidic conditions.
- EC measurements ranged between 276.5 µS/cm (SW401) and 3843 µS/cm (SW402) indicating fresh water conditions.
- Redox measurements ranged between 77.3 mV (SW402) and 340.1 mV (SW501) indicating relatively oxidising conditions.
- DO measurements ranged between 0.08 mg/L (SW402) and 10.53 mg/L (SW506).
- Temperature ranged between 7.7°C (SW501) and 21.1°C (SW403).

4.3 Analytical results

Laboratory documents (including COC, sample receipt notifications, certificates of analysis and quality assurance / quality control) are included in Appendix C.

4.3.1 Water chemistry

Major cations and anions were assessed through the preparation of a piper plot, presented in Figure 4-2.

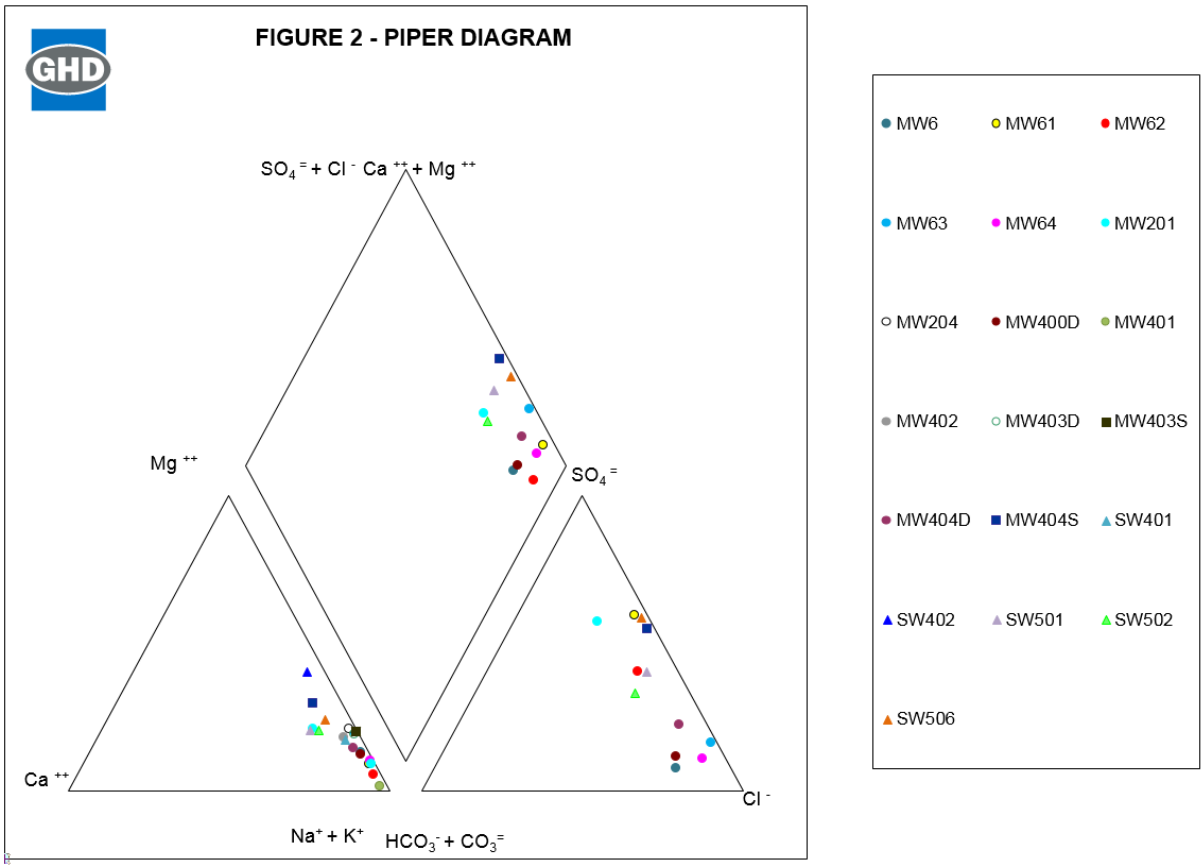

Figure 4-2 Piper Plot for surface and groundwater

As shown in the figure above, the majority of groundwater and surface water samples analysed appear to be sodium-chloride dominant, with a tendency to sulfate dominance in surface waters and shallow groundwater.

4.3.2 Groundwater

Groundwater analytical results are presented in Table 2, Appendix B.

TRH and BTEX

Concentrations of TRH and BTEX were below the laboratory limit of reporting (LOR) for all samples.

PAHs

Concentrations of PAHs were below the laboratory LOR (generally ultra-trace) for all samples. MW201, MW204, MW400D, MW403D and MW403S were analysed at standard levels (not ultra-trace) due to a laboratory container supply error.

Metals

Concentrations of dissolved metals were below the adopted assessment criteria, with the following exceptions:

- Cadmium (MW403D, MW403S, MW404S)
- Cobalt (all samples except MW62, MW205, MW400D, MW401 and MW404D)
- Copper (MW61, MW201, MW401, MW403D, MW403S and MW404D)
- Lead (MW403S)
- Manganese (MW6, MW63, MW402, MW404S)
- Nickel (all locations except MW400D and MW402)
- Zinc (all locations except MW6 and MW400D)

4.3.3 Surface Water

Surface water analytical results are presented in Table 3, Appendix B.

TRH and BTEX

Concentrations of TRH and BTEX were below the laboratory LOR for all samples.

PAH

Concentrations of PAHs were below the laboratory LOR for all samples. SW401 and SW402 were analysed at standard levels (not ultra-trace) due to a laboratory container supply error.

Metals

Concentrations of dissolved metals were below the adopted assessment criteria, with the following exceptions:

- Cobalt (all samples except SW502)
- Copper (SW502 and SW506)
- Manganese (SW402)
- Nickel (SW402, SW501 and SW506)
- Zinc (all locations except SW401 and SW402)

4.3.4 Sediment

The sediment analytical results are presented in Table 4, Appendix B.

All analytes for SED01 were below the adopted assessment criteria, with the exception of Zinc which exceeded the NEPM EIL (based on a conservative assumption that background concentration levels are zero) for Urban Residential Public Open Space. TRH, BTEX and PAH concentrations were all below the laboratory LOR.

5. Quality assurance and quality control (QA/QC) results

5.1 Field

5.1.1 Field quality assurance

All fieldwork was conducted in general accordance with the GHD standard field operating procedures (SFOP).

5.1.2 Field quality control

Field quality control procedures used during the project comprised the collection and analysis of two field intra-laboratory duplicates, one field rinsate (blank), one field blank, and laboratory-supplied trip spikes and blanks.

The field rinsate (blank) sample was collected from the MicroPurge pump head and reported no analytes above the LOR,

No concentrations of volatile parameters were detected in the trip blank, indicating an absence of potential cross contamination (consistent with the absence of volatile analyte detections in the primary samples).

Trip spike recoveries reported no significant loss of volatile analyte concentrations, indicating sample handling (including storage and transport) was adequate.

The precision of the data was assessed by the calculation of the relative percent difference (RPD) between the primary and duplicate samples as presented in Table 1, Appendix B. Both duplicate pairs reported RPDs below the acceptable limits (30% for inorganic analytes and 50% for organic analytes), with the exception of ionic balance, which reported an RPD of 82% for duplicate pair MW404D/FD02. However, ionic balance is a laboratory calculation and therefore not strictly subject to the RPD calculation. This exceedance is not considered to affect the interpretation of the results.

There was an error with the laboratory container supply, which resulted in missed major ion analysis and elevated (standard) LORs for PAHs for some groundwater samples and a couple of surface water samples. Given the general consistency of major ions across the groundwater sampling locations and also across the surface sampling locations, and lack of detections for PAHs for all samples, these issues do not significantly affect the outcome of this assessment.

In general, the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

5.2 Laboratory

5.2.1 Laboratory quality assurance

The analytical laboratory undertook the analyses utilising their own internal procedures and test methods (for which they are NATA accredited) and in accordance with their own quality assurance system which forms part of their NATA accreditation.

5.2.2 Laboratory quality control

The laboratory internal quality control procedure included analysis of quality control samples (duplicates, method blanks, control samples, laboratory controlled spikes, matrix spikes, and sample surrogates), and assessment of holding time compliance and frequency of quality control samples. The laboratory quality control reports are included in Appendix C.

The following outliers were noted:

- A very minor matrix spike recovery exceedance (1% higher than the upper limit) for PAHs in batch ES1716568.
- Matrix spike recoveries not determined (background level greater than or equal to four times the spike level) for sulfate and copper in batch ES1716747.

These outliers are not considered to significantly affect this assessment, therefore the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

Other internal laboratory quality control procedures, as required for NATA registration, are performed and are not reported by the laboratories. These procedures and results can be provided on request.

6. Discussion

No odours or sheens were noted in any of the groundwater wells or surface water locations.

Field parameters were generally consistent with previous monitoring rounds, with the exception of MW403D (at the south western boundary of the site) which reported a pH of 11.96 in October 2015 and 3.93 July 2017. Redox readings were also significantly different at this location, with -256 mV recorded for October 2015, and 365 mV for July 2017. The October 2015 parameters were not consistent with other wells monitored at that time, and may have been due to residual influence from the well construction.

pH was generally neutral to slightly acidic for groundwater and surface water, and conductivity was moderately saline for groundwater, and fresh for surface water.

Field results were generally less extreme in surface water samples, indicating groundwater conditions are “tempered” by surface flow (as with metal concentrations).

Groundwater gauging data is limited, but the groundwater hydrograph indicates relatively consistent groundwater levels and a possible relationship between rainfall and groundwater levels e.g. Following a period of large rainfall mid 2015 (>150mm), groundwater levels appeared to generally increase at MW6. However, more groundwater level data is required to make conclusive statements about rainfall and its effect on groundwater at each monitoring location.

As illustrated in Figure 4-2, the major cations and anion concentrations were generally consistent across the site and indicated some connectivity between surface water and groundwater (especially in the shallow monitoring wells).

As mentioned previously, there was an error with the laboratory container supply, which resulted in missed major ion analysis and elevated (standard) LORs for PAHs for some groundwater and surface water samples. Given the general consistency of major ions across the groundwater sampling locations and also across the surface sampling locations, and lack of detections for PAHs for all samples, these issues do not significantly affect the outcome of this assessment.

Previous surface water investigations in Lot 266 (SW501, SW502 and SW506) analysed total metals (not field or laboratory filtered) and therefore were unsuitable for direct comparison to the dissolved metal concentrations reported for this monitoring event. In this instance, dissolved metals were selected to compare with groundwater concentrations to assess potential connectivity. Consistent with previous investigations, comparison of groundwater and surface water analytical results indicate that the apparent elevated metals concentrations (and ecological assessment criteria exceedences) are associated with natural mineralogy i.e. groundwater samples were generally higher than surface water due to prolonged exposure to the geology.

Notably, PAH was not detected in MW404S for the July 2017 monitoring. This may indicate that the previous investigation sampling was impacted by disturbance of natural carbonaceous material during the monitoring well installation.

7. Conclusions

This report presents the results of groundwater and surface water monitoring conducted in July 2017 for the proposed Development Area for the New Maitland Hospital, Metford Road, Metford, NSW.

Based on the scope of works carried out, the objectives outlined in Section 1.1 and subject to the limitations set out in Section 9, the following conclusions are made:

- Metals concentrations were generally elevated in groundwater but less so in surface water, similar to previous investigations. This is likely to be characteristic of the natural geology/mineralogy and regional groundwater.
- Likewise, the zinc concentration exceeding the EIL in the sediment is likely associated with natural mineralogy.
- Notably, PAH was not detected in MW404S for the July 2017 monitoring. This may indicate that the previous investigation sampling was impacted by disturbance of natural carbonaceous material during the monitoring well installation.

8. References

ANZECC 2000. *National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) , October 2000.NEPC 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999,* as amended by the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), National Environment Protection Council, May 2013.

GHD 2015. *New Maitland Hospital Stage 1 Development Area Phase 2 Environmental Site Assessment Metford Road, Metford NSW*. GHD December 2015.

GHD 2016a. *New Maitland Hospital Stage 1 Development Area Metford, NSW. Remedial Action Plan / Contamination Management Plan*. GHD 4 July 2016.

GHD 2016b. *New Maitland Hospital Stage 2 Development Area Phase 2 Environmental Site Assessment Metford Road, Metford NSW*. GHD 15 July 2016 (DRAFT).

NHMRC. 2011. Australian Drinking Water Guidelines (updated March 2015).

9. Limitations

This report has been prepared by GHD for NSW Health Infrastructure and may only be used and relied on by NSW Health Infrastructure for the purpose agreed between GHD and NSW Health Infrastructure as set out Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than NSW Health Infrastructure arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

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The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by NSW Health Infrastructure and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendices

Appendix A – Figures

Paper Size A4

0 100 200

Metres

N

LEGEND

Site Boundary

1 Investigation sector

GHD

Health Infrastructure
New Maitland Hospital, Metford

Stage 1 Development Area

Water quality monitoring - July 2017
Site Location

Job Number	22-18003
Revision	0
Date	19 Nov 2015

Figure 1

AU\Projects\Launceston\22\18003_LTN_01.cdr

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com

Paper Size A3

0 12.5 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Cadastre
- Stage 1 boundary
- Stage 2 boundary
- Investigation sector boundary
- Groundwater monitoring
- Surface water monitoring

Health Infrastructure
New Maitland Hospital, Metford

Stage 1 Development Area
Groundwater and surface water monitoring - July 2017
Previous monitoring locations

Job Number	22-18003
Revision	0
Date	12 July 2016

Figure 2

G:\22\18003\GIS\Maps\Deliverables\EnvironmentalMonitoring_Stage1_July17\2218003_EM001_MonitoringLocations_A.mxd

Data source: ADW: Survey, 2015; LPI: DTDB / DCDB / Aerial Imagery, 2012. HWC: Dial Before You Dig Sewermain, 2015. Created by: fmackay, tmorton, gmcdiarmid

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au


MW1
MWA
MW93
MW91
MW9
MW92
MW8
MW71
MW4
MW10
MW202
MW32
MW62
MW5
MW61
MW31
MW3
MW6
MW203
MW206
MW204
MW201
MW205
MW11
MW63
MW207
MW64
Fieldsend St
Turton St
Metford Rd
Raymond Terrace Rd
Image © 2015 Sinclair Knight Merz
© 2015 Google
Google earth
2007
Imagery Date: 12/11/2006 32°45'28.16" S 151°36'26.37" E elev 18 m eye alt 1.37 km

Appendix B – Analytical results summary tables

Appendix B
Table 1
Field Measurement Results

Field ID	Sample Date	Easting	Northing	TOC[1]	Stick Up	Ground Level	Screened Interval Top	Screened Interval Bottom	Screened Interval Top	Screened Interval Bottom	Depth to Water	Depth to Water	Well Depth	SWL[5]	Aquifer Geology	Temperature	pH	Electrical Conductivity	Dissolved Oxygen	Redox	Sample Description
				m AHD[2]	m	m AHD	m bgl[3]	m bgl	m AHD	m AHD	m bTOC[4]	m bgl[3]	m bTOC	m AHD		°C	pH Units	uS/cm	mg/L	mV	
Groundwater																					
MW6	5/07/2017	-	-	-	0.6	-	-	-	-	-	12.89	12.29	16.24	-	-	19.6	6.11	4926	0.26	-7.5	Clear, colourless, no odour or sheen
MW61	7/07/2017	-	-	-	0.25	-	-	-	-	-	11.72	11.47	-	-	-	19.8	5.05	1142	0.2	157.2	Clear, colourless, no odour or sheen
MW62	5/07/2017	-	-	-	0.62	-	-	-	-	-	11.32	10.7	22.7	-	-	19.5	5.79	2113	0.09	130.4	Clear, colourless, no odour or sheen
MW63	5/07/2017	-	-	-	0.6	-	-	-	-	-	7.89	7.29	14.91	-	-	20.3	4.74	5601	0.91	280.4	Clear, colourless, no odour or sheen
MW64	5/07/2017	-	-	-	0.7	-	-	-	-	-	3.25	2.55	11.43	-	-	21.1	5.36	4943	1.01	131.4	Slightly turbid
MW201	4/07/2017	-	-	-	0.6	-	-	-	-	-	3.38	2.78	10.88	-	-	19.5	4.1	636	1	418.2	Clear, colourless, no odour or sheen
MW204	4/07/2017	-	-	-	0.68	-	-	-	-	-	2.93	2.25	6.805	-	-	20.6	5.98	2426	0.24	108	light brown, slightly turbid
MW205	5/07/2017	-	-	-	0.6	-	-	-	-	-	1.24	0.64	10.75	-	-	17.7	7.02	5139	3.18	352.1	Clear, colourless, no odour or sheen
MW206	17/06/2016	369905.080	6374507.030	8.51		7.67	3.50	6.50	4.17	1.17	4.95		7.50	3.57	Coal	18.8	4.53	3525	1.56	164	Turbid, grey/ brown
MW207	17/06/2016	370032.210	6374353.450	12.99		12.30	-	-	-	-	9.40		12.64	3.59	-	18.6	6.79	10704	0.27	21.5	Very turbid, grey/ brown
MW400D	26/10/2015	369303.108	6374598.202	19.17		18.55	12.00	18.00	6.55	0.55	12.64		18.52	6.54	Sandstone	20.7	6.06	3867	0.49	38	Turbid grey/brown
MW400D	5/07/2017	369303.108	6374598.202	19.17	0.57	18.55	12.00	18.00	6.55	0.55	12.19	11.62	18.54	6.98	-	19.9	6.16	4866	0.35	66.8	Clear, colourless, no odour or sheen
MW400S	26/10/2015	369304.147	6374632.674	19.28		18.26	1.30	5.80	16.96	12.46	Dry		-	-	Sandstone/Coal/Siltstone	-	-	-	-	-	Dry
MW400S	5/07/2017	369304.147	6374632.674	19.28	-	18.26	1.30	5.80	16.96	12.46	Dry	-	6.23	-	-	-	-	-	-	-	Dry
MW401	26/10/2015	369654.882	6374412.327	9.00		8.31	7.00	12.00	1.31	-3.69	1.93		12.04	7.08	Claystone/Shale/Sandstone	20.4	7.11	8879	0.33	38	Slightly turbid brown
MW401	17/06/2016	369654.882	6374412.327	9.00		8.31	7.00	12.00	1.31	-3.69	2.44		12.04	6.57	Claystone/Shale/Sandstone	-	-	-	-	-	-
MW401	4/07/2017	369654.882	6374412.327	9.00	0.65	8.31	7.00	12.00	1.31	-3.69	1.92	1.27	12.06	7.08	-	19.8	5.35	8522	5.08	322.1	Clear, colourless, no odour or sheen
MW402	26/10/2015	369588.524	6374314.167	10.42		9.81	4.30	10.30	5.51	-0.49	2.71		10.82	7.71	Siltstone/Shale/Claystone/Coal/Sandstone	22.2	6.24	8973	0.52	70	Turbid brown
MW402	17/06/2016	369588.524	6374314.167	10.42		9.81	4.30	10.30	5.51	-0.49	3.13		10.82	7.29	Siltstone/Shale/Claystone/Coal/Sandstone	-	-	-	-	-	-
MW402	5/07/2017	369588.524	6374314.167	10.42	0.60	9.81	4.30	10.30	5.51	-0.49	2.69	2.09	10.83	7.73	-	19.3	5.95	10462	0.51	61.8	Slightly turbid
MW403D	26/10/2015	368987.526	6374343.840	21.72		21.11	16.80	22.85	4.31	-1.74	5.94		22.30	15.78	Sandstone/Siltstone/Coal/Shale	21.7	11.96	7011	0.35	-256	Clear
MW403D	4/07/2017	368987.526	6374343.840	21.72	0.68	21.11	16.80	22.85	4.31	-1.74	6.17	5.493	22.22	15.55	-	19.5	3.93	11451	0.72	365.4	light brown/red, solid floating particles v
MW403S	26/10/2015	368986.635	6374344.103	21.55		21.06	4.95	8.00	16.11	13.06	2.43		8.35	19.12	Claystone/Siltstone/Shale/Coal	21.4	4.54	11128	0.40	219	Turbid brown
MW403S	4/07/2017	368986.635	6374344.103	21.55	0.70	21.06	4.95	8.00	16.11	13.06	2.68	1.978	8.62	18.88	-	18.9	3.71	12596	0.61	299.2	Clear, colourless, no odour or sheen
MW404S	26/10/2015	369512.830	6374553.330	8.83		8.10	0.30	1.00	7.80	7.10	1.23		1.58	7.60	Sandy-Clay/Claystone/Sandstone	-	-	-	-	-	Grey/brown. Insufficient water for measurements
MW404S	17/06/2016	369512.830	6374553.330	8.83		8.10	0.30	1.00	7.80	7.10	1.38		1.58	7.45	Claystone	-	-	-	-	-	-
MW404S	6/07/2017	369512.830	6374553.330	8.83	0.50	8.10	0.30	1.00	7.80	7.10	0.97	0.47	1.58	7.86	-	-	-	-	-	-	Brown, med. turbidity. Insufficient water for measurements
MW404D	26/10/2015	369513.479	6374553.664	8.65		8.13	6.00	9.00	2.13	-0.87	0.61		9.59	8.04	Claystone	19.5	5.93	4081	3.00	78	Turbid grey/brown
MW404D	17/06/2016	369513.479	6374553.664	8.65		8.13	6.00	9.00	2.13	-0.87	0.73		9.59	7.93	Sandy-Clay/Claystone/Sandstone	-	-	-	-	-	-
MW404D	6/07/2017	369513.479	6374553.664	8.65	0.50	8.13	6.00	9.00	2.13	-0.87	0.55	0.05	9.60	8.10	-	16.5	6.09	4887	4.97	303.9	Clear, colourless, no odour or sheen
MW501	17/06/2016	369763.000	6374452.670	8.02		7.14	6.00	9.00	1.14	-1.86	2.90		9.76	5.13	Siltstone/ Coal	20.1	5.72	14238	2.44	80.4	Grey, slighty turbid
MW502	17/06/2016	369963.070	6374277.530	14.35		13.83	8.70	11.70	5.13	2.13	8.31		12.00	6.05	Siltstone/ Coal	19	6.86	11181	1.51	93.5	Pale grey, slighty turbid
MW503S	17/06/2016	369778.740	6374633.940	9.22		8.21	3.90	8.40	4.31	-0.19	5.10		8.93	4.13	Siltstone	18.2	6.69	12260	1.15	5.4	Pale brown, turbid
MW503D	17/06/2016	369777.750	6374634.630	9.30		8.25	12.00	15.00	-3.75	-6.75	5.06		15.99	4.24	Siltstone/ Clayey SILT	18.3	6.48	11352	2.36	97	Pale grey, slighty turbid
MW504	17/06/2016	369653.180	6374529.310	8.03		7.09	0.40	1.40	6.69	5.69	1.05		2.52	6.98	Clay/ Coal	18.5	5.65	10114	2.88	191	Clear
MW505	17/06/2016	369774.790	6374227.470	13.66		12.72	10.40	13.40	2.32	-0.68	8.38		14.19	5.28	Coal	15.4	6.44	14890	1.6	74.2	Pale grey, slighty turbid
Surface Water																					
SW401	26/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.7	6.22	233	0.96	67	Tanin coloured, turbid. Ponded water approx. 3 m wide, 0.2-0.3 m deep
SW401	4/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.3	5.37	276.5	4.02	252.8	Green, low turbidity, no odour or sheen
SW402	26/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.5	7.30	1711	7.30	33	Tanin, slightly turbid. Wetlands 0.5 m deep.
SW402	4/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.8	5.20	3843	0.08	77.3	Green, low turbidity, no odour or sheen
SW403	27/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.1	7.17	346	6.44	130	Turbid, slightly grey. Ponded water/dam 5-10 m wide, >0.5 m deep
SW501	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.9	6.11	1311	10.87	129	Clear, colourless
SW501	7/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.7	6.41	698.6	9.2	340.1	very slightly green, clear, no odour or s
SW502	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.9	6.05	1998	5.06	140.2	Yellow/brown, slightly turbid
SW502	7/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6	6.65	777	4.51	197.6	Clear, colourless, no odour or sheen
SW503	16/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.2	8.58	775	13.51	85.7	Clear, colourless
SW504	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6	8.41	687	5.36	118.1	Clear, colourless
SW505	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.4	6.24	1305	8.02	59.3	Clear, colourless
SW506	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.2	8.41	1330	7.02	120.3	Clear, colourless
SW506	7/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.8	5.97	649.2	10.53	266.1	slightly turbid, colourless, no odour or s
SW507	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.8	6.13	2398	7.25	-6.3	Clear, colourless
SW508	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.9	6.82	247.6	0.83	-87.3	Clear, colourless
SW509	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.5	6.72	284.8	1.48	31.9	Tanin coloured, turbid
SW510	17/06/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.9	6.54	231.7	2.19	44.4	Slightly yellow/brown, slightly turbid

[1] TOC = Top of Casing
[2] AHD = Australian Height Datum
[3] m bgl = metres below ground level
[4] m bTOC = metres below Top of Casing
[5] SWL = Standing Water Level

			Major Ions										Alkalinity				Metals (dissolved)										
			Fluoride	Sulfate as SO4 - Turbidimetric (filtered)	Calcium (filtered)	Chloride	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Anions Total	Cations Total	Ionic Balance	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Arsenic	Barium	Cadmium	Chromium (III+VI)	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Zinc
			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	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR			0.1	1	1	1	1	1	1	0.01	0.01	0.01	1	1	1	1	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.0001	0.001	0.005
ANZECC 2000 FW Med-Low Reliability																	0.013		0.0002		0.0014	0.0014	0.0034	1.7		0.011	0.008
NEPM 2013 Table 1A(4) HSL A/B Res GW for Vapour Intrusion, Sanc																											
2-4m																											
4-8m																											
>8m																											
NEPM 2013 Table 1C GILs, Fresh Waters																			0.0002			0.0014	0.0034	1.9	0.00006	0.011	0.008
Location Code	**Date**	**Field ID**																									
MW6	5/07/2017	MW6	0.7	160	24	1,200	78	22	959	44.8	49.9	5.36	<1	<1	382	382	0.011	0.075	<0.0001	<0.001	0.037	<0.001	<0.001	2.48	<0.0001	0.024	0.008
MW61	7/07/2017	MW61	0.5	269	3	123	10	6	188	9.41	9.30	0.57	<1	<1	17	17	0.001	0.005	<0.0001	<0.001	0.054	0.003	<0.001	0.131	<0.0001	0.041	0.089
MW62	5/07/2017	MW62	0.6	376	8	328	13	9	416	19.5	19.8	0.75	<1	<1	121	121	<0.001	0.036	<0.0001	<0.001	<0.001	<0.001	<0.001	0.061	<0.0001	0.022	0.010
MW63	5/07/2017	MW63	0.5	380	13	1,430	144	22	1,080	49.1	60.0	9.99	<1	<1	44	44	<0.001	0.149	<0.0001	<0.001	0.004	<0.001	<0.001	2.66	<0.0001	0.056	0.049
MW64	5/07/2017	MW64	1.2	217	9	1,230	58	19	971	42.2	47.9	6.36	<1	<1	150	150	<0.001	0.055	<0.0001	<0.001	0.005	<0.001	<0.001	0.490	<0.0001	0.058	0.053
MW201	4/07/2017	MW201	-	-	1	-	5	<1	96	-	-	-	-	-	-	-	<0.001	0.067	<0.0001	<0.001	0.008	0.004	0.002	0.041	<0.0001	0.063	0.137
MW204	4/07/2017	MW204	-	-	11	-	62	12	430	-	-	-	-	-	-	-	<0.001	0.008	<0.0001	<0.001	0.019	<0.001	<0.001	1.68	<0.0001	0.019	0.028
MW205	5/07/2017	MW205	1.2	1,630	176	560	166	21	982	59.6	65.7	4.90	<1	<1	492	492	0.002	0.013	<0.0001	<0.001	0.001	<0.001	<0.001	0.059	<0.0001	0.123	0.020
MW400D	26/10/2015	MW400D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	<0.0001	<0.001	-	<0.001	<0.001	-	<0.0001	0.002	0.021
MW400D	5/07/2017	MW400D	0.8	240	25	1,150	73	22	946	44.0	49.0	5.31	<1	<1	330	330	0.002	0.048	<0.0001	<0.001	<0.001	<0.001	<0.001	0.201	<0.0001	0.004	0.008
MW401	26/10/2015	MW401	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.012	-	<0.0001	<0.001	-	<0.001	<0.001	-	<0.0001	0.02	0.015
MW401	4/07/2017	MW401	-	-	36	-	14	101	1,760	-	-	-	-	-	-	-	0.001	0.128	<0.0001	0.030	<0.001	0.002	<0.001	0.005	<0.0001	0.169	0.020
MW402	26/10/2015	MW402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	<0.0001	<0.001	-	<0.001	<0.001	-	<0.0001	0.014	0.027
MW402	5/07/2017	MW402	-	-	110	-	238	24	1,890	-	-	-	-	-	-	-	<0.001	0.054	<0.0001	<0.001	0.004	<0.001	<0.001	2.11	<0.0001	0.010	0.017
MW403D	26/10/2015	MW403D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	<0.0001	<0.001	-	0.002	<0.001	-	<0.0001	0.006	<0.005
MW403D	4/07/2017	MW403D	-	-	28	-	261	25	2,040	-	-	-	-	-	-	-	<0.001	0.085	0.0020	<0.001	0.189	0.006	0.002	0.352	<0.0001	0.216	1.00
MW403S	26/10/2015	MW403S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	0.0054	<0.001	-	0.006	0.009	-	<0.0001	0.152	1.27
MW403S	4/07/2017	MW403S	-	-	8	-	318	26	2,350	-	-	-	-	-	-	-	0.005	0.053	0.0058	<0.001	0.224	0.011	0.012	0.090	<0.0001	0.337	1.46
MW403S	4/07/2017	FD01	-	-	8	-	311	26	2,330	-	-	-	-	-	-	-	0.005	0.054	0.0058	<0.001	0.224	0.010	0.012	0.086	<0.0001	0.320	1.43
MW404D	26/10/2015	MW404D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.0001	<0.001	-	0.001	<0.001	-	<0.0001	0.134	0.046
MW404D	6/07/2017	MW404D	0.9	506	42	1,160	96	18	1,010	47.4	54.4	6.87	<1	<1	207	207	<0.001	0.026	<0.0001	<0.001	<0.001	0.002	<0.001	0.058	<0.0001	0.040	0.024
MW404D	6/07/2017	FD02	0.9	677	42	1,160	95	18	1,000	50.8	53.9	2.88	<1	<1	202	202	<0.001	0.028	<0.0001	<0.001	<0.001	0.002	<0.001	0.063	<0.0001	0.040	0.025
MW404S	26/10/2015	MW404S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.0001	<0.001	-	<0.001	<0.001	-	<0.0001	0.017	0.03
MW404S	6/07/2017	MW404S	3.3	3,320	248	1,930	508	37	1,980	127	141	5.45	<1	<1	154	154	<0.001	0.020	0.0008	<0.001	0.521	<0.001	<0.001	34.4	<0.0001	0.228	1.16
QA/QC																											
MW403S	4/07/2017	MW403S	-	-	8	-	318	26	2,350	-	-	-	-	-	-	-	0.005	0.053	0.0058	<0.001	0.224	0.011	0.012	0.090	<0.0001	0.337	1.46
MW403S	4/07/2017	FD01	-	-	8	-	311	26	2,330	-	-	-	-	-	-	-	0.005	0.054	0.0058	<0.001	0.224	0.010	0.012	0.086	<0.0001	0.320	1.43
RPDs (%)			*NC*	*NC*	*0*	*NC*	*2*	*0*	*1*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*0*	*2*	*0*	*NC*	*0*	*10*	*0*	*5*	*NC*	*5*	*2*
MW404D	6/07/2017	MW404D	0.9	506	42	1,160	96	18	1,010	47.4	54.4	6.87	<1	<1	207	207	<0.001	0.026	<0.0001	<0.001	<0.001	0.002	<0.001	0.058	<0.0001	0.040	0.024
MW404D	6/07/2017	FD02	0.9	677	42	1,160	95	18	1,000	50.8	53.9	2.88	<1	<1	202	202	<0.001	0.028	<0.0001	<0.001	<0.001	0.002	<0.001	0.063	<0.0001	0.040	0.025
RPDs (%)			*0*	*29*	*0*	*0*	*1*	*0*	*1*	*7*	*1*	*82*	*NC*	*NC*	*2*	*2*	*NC*	*7*	*NC*	*NC*	*NC*	*0*	*NC*	*8*	*NC*	*0*	*4*

Appendix B Table 2
Groundwater Analytical Results

2218003
NSW Health Infrastructure
New Maitland Hospital Stage 1 Development
Groundwater and surface water Monitoring - July 2017

			TRH - NEPM 2013							BTEX							PAH																							
			C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	2-methylnaphthalene	3-methylcholanthrene	7,12-dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(e)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene	Chrysene	Coronene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR			20	20	100	100	100	100	100	1	2	2	2	2	2	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05
ANZECC 2000 FW Med-Low Reliability										950	180	80	350									0.01		0.1									1			16		0.6		
NEPM 2013 Table 1A(4) HSL A/B Res GW for Vapour Intrusion, Sanc																																								
2-4m			1,000		1,000					800	NL	NL			NL																					NL				
4-8m			1,000		1,000					800	NL	NL			NL																					NL				
>8m			1,000		1,000					900	NL	NL			NL																					NL				
NEPM 2013 Table 1C GILs, Fresh Waters										950			350																							16				
Location Code	**Date**	**Field ID**																																						
MW6	5/07/2017	MW6	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW61	7/07/2017	MW61	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW62	5/07/2017	MW62	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW63	5/07/2017	MW63	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW64	5/07/2017	MW64	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW201	4/07/2017	MW201	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW204	4/07/2017	MW204	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW205	5/07/2017	MW205	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW400D	26/10/2015	MW400D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW400D	5/07/2017	MW400D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW401	26/10/2015	MW401	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW401	4/07/2017	MW401	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW402	26/10/2015	MW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW402	5/07/2017	MW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW403D	26/10/2015	MW403D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW403D	4/07/2017	MW403D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW403S	26/10/2015	MW403S	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW403S	4/07/2017	MW403S	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW403S	4/07/2017	FD01	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW404D	26/10/2015	MW404D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1.0	<0.5
MW404D	6/07/2017	MW404D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW404D	6/07/2017	FD02	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW404S	26/10/2015	MW404S	<20	<20	130	130	5,060	3,080	8,270	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	1.8	1.6	2	-	2.3	<1	1.8	2.7	-	<1	2.4	1.6	<1	2.2	-	11.6	3.1	31.1
MW404S	6/07/2017	MW404S	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
QA/QC																																								
MW403S	4/07/2017	MW403S	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
MW403S	4/07/2017	FD01	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
RPDs (%)			*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*
MW404D	6/07/2017	MW404D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
MW404D	6/07/2017	FD02	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
RPDs (%)			*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*

			Major Ions										Alkalinity				Metals (dissolved)										
			Fluoride	Sulfate as SO4 - Turbidimetric (filtered)	Calcium (filtered)	Chloride	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)	Anions Total	Cations Total	Ionic Balance	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Arsenic	Barium	Cadmium	Chromium (III+VI)	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Zinc
			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	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR			0.1	1	1	1	1	1	1	0.01	0.01	0.01	1	1	1	1	0.001	0.001	0.0001	0.001	0.001	0.001	0.001	0.001	0.0001	0.001	0.005
ANZECC 2000 FW Med-Low Reliability																	0.013		0.0002		0.0014	0.0014	0.0034	1.7		0.011	0.008
NEPM 2013 Table 1C GILs, Fresh Waters																			0.0002			0.0014	0.0034	1.9	0.00006	0.011	0.008
Location Code	**Date**	**Field ID**																									
SW401	26/10/2015	SW401	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	<0.0001	<0.001	-	0.001	0.005	-	<0.0001	0.01	0.013
SW401	4/07/2017	SW401	-	-	3	-	6	4	49	-	-	-	-	-	-	-	<0.001	0.090	<0.0001	<0.001	0.005	0.001	<0.001	0.149	<0.0001	0.008	0.051
SW402	26/10/2015	SW402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.0001	<0.001	-	<0.001	<0.001	-	<0.0001	0.002	<0.005
SW402	4/07/2017	SW402	-	-	80	-	356	6	905	-	-	-	-	-	-	-	<0.001	0.050	<0.0001	<0.001	0.268	<0.001	<0.001	5.22	<0.0001	0.099	0.250
SW501	17/06/2016	SW501	2	242	49	163	31	9	140	11.2	11.3	0.62	<1	<1	77	77	-	-	-	-	-	-	-	-	-	-	-
SW501	7/07/2017	SW501	0.9	133	22	122	19	5	110	6.87	7.57	4.88	<1	<1	33	33	<0.001	0.025	<0.0001	<0.001	0.004	0.012	<0.001	0.135	<0.0001	0.013	0.119
SW502	17/06/2016	SW502	1.9	532	84	308	61	13	244	19.9	20.2	0.58	<1	<1	8	8	-	-	-	-	-	-	-	-	-	-	-
SW502	7/07/2017	SW502	1.1	119	18	132	19	6	116	7.46	7.66	1.33	<1	<1	63	63	<0.001	0.025	<0.0001	<0.001	<0.001	0.002	<0.001	0.011	<0.0001	0.003	0.009
SW506	17/06/2016	SW506	1	321	30	151	47	8	160	12.5	12.5	0.17	<1	<1	77	77	-	-	-	-	-	-	-	-	-	-	-
SW506	17/06/2016	FD526SW	1	305	30	150	46	8	157	12	12.3	1.2	<1	<1	72	72	-	-	-	-	-	-	-	-	-	-	-
SW506	7/07/2017	SW506	0.4	150	10	74	18	5	93	5.31	6.15	7.36	<1	<1	5	5	<0.001	0.030	<0.0001	<0.001	0.003	0.003	<0.001	0.048	<0.0001	0.016	0.191

			TRH - NEPM 2013							BTEX							PAH																							
			C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	2-methylnaphthalene	3-methylcholanthrene	7,12-dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(e)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene	Chrysene	Coronene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	PAHs (Sum of total) - Lab calc
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR			20	20	100	100	100	100	100	1	2	2	2	2	2	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05
ANZECC 2000 FW Med-Low Reliability										950	180	80	350									0.01		0.1								1			16		0.6		
NEPM 2013 Table 1C GILs, Fresh Waters										950			350																						16				
Location Code	**Date**	**Field ID**																																						
SW401	26/10/2015	SW401	<20	<20	<100	<100	220	<100	220	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1	-
SW401	4/07/2017	SW401	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
SW402	26/10/2015	SW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1	<1	<1	<1	<0.5	<0.5	-	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	-	<1	<1	-
SW402	4/07/2017	SW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	-	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	-	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<0.5
SW501	17/06/2016	SW501	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW501	7/07/2017	SW501	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW502	17/06/2016	SW502	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW502	7/07/2017	SW502	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW506	17/06/2016	SW506	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW506	17/06/2016	FD526SW	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
SW506	7/07/2017	SW506	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05

					Inorganics	Major Ions	Metals											TRH - NEPM 2013							BTEX						
					% Moisture	Fluoride	Arsenic	Barium	Cadmium	Chromium (III+VI)	Cobalt	Copper	Lead	Manganese	Mercury	Nickel	Zinc	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc
					%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					1	40	5	10	1	2	2	5	5	5	0.1	2	5	10	10	50	50	100	100	50	0.2	0.5	0.5	0.5	0.5	0.5	0.2
CRCCare Soil Direct Contact HSL-A Residential (Low Density)																			4,400		3,300	4,500	6,300		100	14,000	4,500			12,000	
NEPM 2013 EIL-Urban Residential- Public Open Space							100					60	1,100			30	70														
NEPM 2013 Table 1A(1) HIL A Res							100		20	100	100	6,000	300	3,800	40	400	7,400														
NEPM 2013 Table 1A(3) HSL A/B Res Soil for Vapour Intrusion, Sand 0-1m																		45		110					0.5	160	55			40	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2m																		180			120	1,300	5,600		65	105	125			45	
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																			**700**		**1,000**	**2,500**	**10,000**								
USEPA Region 3,6,9 Residental THQ=1.0						3,100		15,000																							
Location Code	**Depth**	**Date**	**Field ID**	**Sample Type**																											
SED01	0.0-0.1	5/07/2017	SED01	Normal	42.3	300	5	70	<1	3	23	17	16	244	<0.1	14	108	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2

					PAH																		
					Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (half LOR) - Lab Calc	Benzo(a)pyrene TEQ (LOR) - Lab Calc	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	PAHs (sum of total) - Lab Calc	Pyrene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CRCCare Soil Direct Contact HSL-A Residential (Low Density)																					1,400			
NEPM 2013 EIL-Urban Residential- Public Open Space																					170			
NEPM 2013 Table 1A(1) HIL A Res										3	3	3												
NEPM 2013 Table 1A(3) HSL A/B Res Soil for Vapour Intrusion, Sand 0-1m																					3			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2m									0.7															
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																								
USEPA Region 3,6,9 Residental THQ=1.0																								
Location Code	**Depth**	**Date**	**Field ID**	**Sample Type**																				
SED01	0.0-0.1	5/07/2017	SED01	Normal	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Appendix C – Laboratory documentation

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1716388**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 04-Jul-2017 15:36
Order number	: 2218003	Date Analysis Commenced	: 05-Jul-2017
C-O-C number	: ----	Issue Date	: 10-Jul-2017 17:17
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 12		
No. of samples analysed	: 12		

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*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	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 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.

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.

- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEX compounds spiked at 20 ug/L.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FD01	MW403S	MW403D	SW401	MW201
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-001	ES1716388-002	ES1716388-003	ES1716388-004	ES1716388-005
					Result	Result	Result	Result	Result
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		8	8	28	3	1
Magnesium	7439-95-4	1	mg/L		311	318	261	6	5
Sodium	7440-23-5	1	mg/L		2330	2350	2040	49	96
Potassium	7440-09-7	1	mg/L		26	26	25	4	<1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.005	0.005	<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		0.054	0.053	0.085	0.090	0.067
Beryllium	7440-41-7	0.001	mg/L		0.013	0.014	0.008	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		0.0058	0.0058	0.0020	<0.0001	<0.0001
Cobalt	7440-48-4	0.001	mg/L		0.224	0.224	0.189	0.005	0.008
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.010	0.011	0.006	0.001	0.004
Manganese	7439-96-5	0.001	mg/L		0.086	0.090	0.352	0.149	0.041
Nickel	7440-02-0	0.001	mg/L		0.320	0.337	0.216	0.008	0.063
Lead	7439-92-1	0.001	mg/L		0.012	0.012	0.002	<0.001	0.002
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		1.43	1.46	1.00	0.051	0.137
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FD01	MW403S	MW403D	SW401	MW201
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-001	ES1716388-002	ES1716388-003	ES1716388-004	ES1716388-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
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
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
>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: 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	1330-20-7	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		**28.4**	**26.8**	**27.6**	**28.4**	**26.5**
2-Chlorophenol-D4	93951-73-6	1	%		**66.5**	**50.8**	**57.4**	**63.6**	**69.3**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	FD01	MW403S	MW403D	SW401	MW201
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-001	ES1716388-002	ES1716388-003	ES1716388-004	ES1716388-005
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
2.4.6-Tribromophenol	118-79-6	1	%		59.1	49.8	57.8	66.8	62.5
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		86.4	71.0	78.2	79.6	89.0
Anthracene-d10	1719-06-8	1	%		95.6	93.3	78.9	75.4	81.9
4-Terphenyl-d14	1718-51-0	1	%		75.6	71.1	83.3	80.5	77.6
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		102	121	115	127	108
Toluene-D8	2037-26-5	2	%		90.1	104	104	115	89.3
4-Bromofluorobenzene	460-00-4	2	%		83.4	102	92.1	98.7	83.8

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW204	SW402	MW401	RB01	FB01
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-006	ES1716388-007	ES1716388-008	ES1716388-009	ES1716388-010
					Result	Result	Result	Result	Result
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**11**	**80**	**36**	----	----
Magnesium	7439-95-4	1	mg/L		**62**	**356**	**14**	----	----
Sodium	7440-23-5	1	mg/L		**430**	**905**	**1760**	----	----
Potassium	7440-09-7	1	mg/L		**12**	**6**	**101**	----	----
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		**0.008**	**0.050**	**0.128**	----	----
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		**0.019**	**0.268**	<0.001	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	**0.030**	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	**0.002**	----	----
Manganese	7439-96-5	0.001	mg/L		**1.68**	**5.22**	**0.005**	----	----
Nickel	7440-02-0	0.001	mg/L		**0.019**	**0.099**	**0.169**	----	----
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		**0.028**	**0.250**	**0.020**	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW204	SW402	MW401	RB01	FB01
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-006	ES1716388-007	ES1716388-008	ES1716388-009	ES1716388-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
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
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
>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: 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	1330-20-7	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		**26.2**	**25.9**	**28.0**	**24.3**	**21.0**
2-Chlorophenol-D4	93951-73-6	1	%		**61.0**	**70.0**	**62.4**	**61.9**	**43.9**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW204	SW402	MW401	RB01	FB01
				Client sampling date / time	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00	04-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716388-006	ES1716388-007	ES1716388-008	ES1716388-009	ES1716388-010
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
2.4.6-Tribromophenol	118-79-6	1	%		59.1	76.7	71.5	43.0	34.8
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		87.5	87.2	83.0	86.8	70.2
Anthracene-d10	1719-06-8	1	%		91.1	85.2	89.4	85.1	95.7
4-Terphenyl-d14	1718-51-0	1	%		78.5	83.4	80.9	83.2	77.8
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		113	122	101	114	99.3
Toluene-D8	2037-26-5	2	%		98.8	97.2	82.2	99.3	82.3
4-Bromofluorobenzene	460-00-4	2	%		87.3	89.4	77.0	85.6	74.4

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	TS01	TB01	----	----	----
			Client sampling date / time	30-Jun-2017 00:00	30-Jun-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1716388-011	ES1716388-012	--------	--------	--------
				Result	Result	----	----	----
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	**20**	<1	**----**	**----**	**----**
Toluene	108-88-3	2	µg/L	**20**	<2	**----**	**----**	**----**
Ethylbenzene	100-41-4	2	µg/L	**19**	<2	**----**	**----**	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	**19**	<2	**----**	**----**	**----**
ortho-Xylene	95-47-6	2	µg/L	**20**	<2	**----**	**----**	**----**
^ **Total Xylenes**	1330-20-7	2	µg/L	**39**	<2	**----**	**----**	**----**
^ **Sum of BTEX**	----	1	µg/L	**98**	<1	**----**	**----**	**----**
Naphthalene	91-20-3	5	µg/L	**21**	<5	**----**	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	**113**	**113**	**----**	**----**	**----**
Toluene-D8	2037-26-5	2	%	**99.8**	**100**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%	**103**	**89.5**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1716388**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 04-Jul-2017
Order number	: 2218003	Date Analysis Commenced	: 05-Jul-2017
C-O-C number	: ----	Issue Date	: 10-Jul-2017
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 12		
No. of samples analysed	: 12		

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*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	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

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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 982560)									
ES1716374-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	8	7	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	22	22	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
ES1716388-003	MW403D	ED093F: Calcium	7440-70-2	1	mg/L	28	28	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	261	261	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2040	2050	0.556	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	25	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 980369)									
ES1716388-008	MW401	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	0.002	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	0.128	0.129	0.00	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.030	0.030	0.00	0% - 20%
		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	0.005	0.006	25.1	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.169	0.168	0.642	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.020	0.018	11.3	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
ES1716298-009	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

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: 980369) - continued									
ES1716298-009	Anonymous	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	<0.001	<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	0.021	0.023	8.42	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	0.068	0.066	4.00	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
EG035F: Dissolved Mercury by FIMS (QC Lot: 980367)									
ES1716298-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1716298-009	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 981625)									
ES1716368-002	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1716388-005	MW201	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 981625)									
ES1716368-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1716388-005	MW201	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 981625)									
ES1716368-002	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
ES1716388-005	MW201	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

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
ED093F: Dissolved Major Cations (QCLot: 982560)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.8	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	98.4	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.7	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 980369)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.4	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	98.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.4	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.1	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	94.9	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	91.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.6	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	90.4	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	95.2	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.4	85	115
EG035F: Dissolved Mercury by FIMS (QCLot: 980367)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	83	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 980491)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	67.8	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	89.5	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	85.4	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	96.3	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	80.7	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	84.8	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	80.4	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	81.8	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	69.6	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	77.0	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	81.6	62	119

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 980491) - continued								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	95.8	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	90.4	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	82.8	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.3	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	81.8	59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 980492)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.0	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	90.2	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	83.5	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981625)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	106	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 980492)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.3	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	91.5	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	80.6	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981625)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	108	75	127
EP080: BTEXN (QCLot: 981625)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	106	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	101	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	102	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	106	70	120

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
EG020F: Dissolved Metals by ICP-MS (QCLot: 980369)							
ES1716298-010	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	76.8	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	102	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	97.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.4	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: 980369) - continued							
ES1716298-010	Anonymous	EG020A-F: Chromium	7440-47-3	1 mg/L	98.2	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	93.7	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	93.1	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	92.7	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	99.2	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	93.7	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	98.5	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	93.2	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 980367)							
ES1716291-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	78.8	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 981625)							
ES1716368-002	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	74.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 981625)							
ES1716368-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	70.8	70	130
EP080: BTEXN (QCLot: 981625)							
ES1716368-002	Anonymous	EP080: Benzene	71-43-2	25 µg/L	78.4	70	130
		EP080: Toluene	108-88-3	25 µg/L	75.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	77.2	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	77.6	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	81.4	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.9	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1716388**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 04-Jul-2017
Site	: ----	Issue Date	: 10-Jul-2017
Sampler	: BEC ASHLEE	No. of samples received	: 12
Order number	: 2218003	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.**
- **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	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	19	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*
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401	**04-Jul-2017**	**----**	----	----	**06-Jul-2017**	01-Aug-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401	**04-Jul-2017**	**----**	----	----	**05-Jul-2017**	31-Dec-2017	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401	**04-Jul-2017**	**----**	----	----	**06-Jul-2017**	01-Aug-2017	✓

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401, RB01, FB01	**04-Jul-2017**	**05-Jul-2017**	11-Jul-2017	✓	**06-Jul-2017**	14-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401, RB01, FB01	**04-Jul-2017**	**05-Jul-2017**	11-Jul-2017	✓	**06-Jul-2017**	14-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401, RB01, FB01	**04-Jul-2017**	**07-Jul-2017**	18-Jul-2017	✓	**07-Jul-2017**	18-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TB01	**30-Jun-2017**	**07-Jul-2017**	14-Jul-2017	✓	**07-Jul-2017**	14-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401, RB01, FB01	**04-Jul-2017**	**05-Jul-2017**	11-Jul-2017	✓	**06-Jul-2017**	14-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
FD01, MW403S, MW403D, SW401, MW201, MW204, SW402, MW401, RB01, FB01	**04-Jul-2017**	**07-Jul-2017**	18-Jul-2017	✓	**07-Jul-2017**	18-Jul-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
TB01	**30-Jun-2017**	**07-Jul-2017**	14-Jul-2017	✓	**07-Jul-2017**	14-Jul-2017	✓

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)								
FD01,	MW403S,	**04-Jul-2017**	**07-Jul-2017**	18-Jul-2017	✓	**07-Jul-2017**	18-Jul-2017	✓
MW403D,	SW401,							
MW201,	MW204,							
SW402,	MW401,							
RB01,	FB01							
Amber VOC Vial - Sulfuric Acid (EP080)								
TS01,	TB01	**30-Jun-2017**	**07-Jul-2017**	14-Jul-2017	✓	**07-Jul-2017**	14-Jul-2017	✓

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)							
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**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)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**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)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**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)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	19	**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
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.
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)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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)

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 60mL 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.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Health Infrastructure

OFFICE: Newcastle GHD

PROJECT: NMH Phase 2 — PROJECT NO: 2218003

ORDER NUMBER: — PURCHASE ORDER NO.: 2218003

PROJECT MANAGER: Ian Gregson — CONTACT PH: 49799999

SAMPLER: Bec Ashlee — SAMPLER MOBILE: 0432700322

COC Emailed to ALS? (YES / NO) — EDD FORMAT (or default): ESDAT

Email Reports to (will default to PM if no other addresses are listed): ian.gregson@ghd.com

Email Invoice to (will default to PM if no other addresses are listed): ian.gregson@ghd.com

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)
☐ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: (1) 2 3 4 5 6 7
OF: (1) 2 3 4 5 6 7

RELINQUISHED BY: Bec Ashlee
DATE/TIME: 4.7.17 1540

RECEIVED BY: DB
DATE/TIME: 4/7/17 3:40pm

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: Scossa
DATE/TIME: 4/7/17 1925

FOR 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: 2.3 °C
Other comment:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).				Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH/ BTEX / PAH	Suit W-30	Major Ions		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	FD01	4.7.17	W			X	X	X		
2	MW403S					X	X	X		
3	MW403D					X	X	X		
4	SW401					X	X	X		
5	MW201					X	X	X		
6	MW204					X	X	X		
7	SW402					X	X	X		
8	MW401					X	X	X		
9	RB01					X	X	X		
10	FB01					X	[illegible]	[illegible]		
11	TS01					X	[illegible]	[illegible]		
12	TB01					X				
					TOTAL					

Environmental Division
Sydney
Work Order Reference
ES1716388

Telephone : +61-2-8784 8555

Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic; VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1716388**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ian.gregson@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Facsimile	: +61 7979 9988	Facsimile	: +61-2-8784 8500
Project	: 2218003 NMH PHASE 2	Page	: 1 of 2
Order number	: 2218003	Quote number	: ES2015GHDSER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BEC ASHLEE		

Dates

Date Samples Received	: 04-Jul-2017 15:36	Issue Date	: 05-Jul-2017
Client Requested Due Date	: 10-Jul-2017	Scheduled Reporting Date	: **10-Jul-2017**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 2.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

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
- 5/7/17: This is an updated SRA which indicates the major cations has been added.
- This is an updated SRA which indicates the new change of analysis for this work order.
- **Due to natural bottle not being supplied, unable to conduct Major Anions.**
- **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 (14 days), Solid (60 days) from date of completion of work order.

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 - EP080 BTEXN	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-07 TRH/BTEXN/PAH	WATER - W-18 TRH(C6 - C9)/BTEXN
ES1716388-001	04-Jul-2017 00:00	FD01		✓	✓	✓	
ES1716388-002	04-Jul-2017 00:00	MW403S		✓	✓	✓	
ES1716388-003	04-Jul-2017 00:00	MW403D		✓	✓	✓	
ES1716388-004	04-Jul-2017 00:00	SW401		✓	✓	✓	
ES1716388-005	04-Jul-2017 00:00	MW201		✓	✓	✓	
ES1716388-006	04-Jul-2017 00:00	MW204		✓	✓	✓	
ES1716388-007	04-Jul-2017 00:00	SW402		✓	✓	✓	
ES1716388-008	04-Jul-2017 00:00	MW401		✓	✓	✓	
ES1716388-009	04-Jul-2017 00:00	RB01				✓	
ES1716388-010	04-Jul-2017 00:00	FB01				✓	
ES1716388-011	30-Jun-2017 00:00	TS01	✓				
ES1716388-012	30-Jun-2017 00:00	TB01					✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

IAN GREGSON

- *AU Certificate of Analysis - NATA (COA)	Email	ian.gregson@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ian.gregson@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ian.gregson@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ian.gregson@ghd.com
- A4 - AU Tax Invoice (INV)	Email	ian.gregson@ghd.com
- Chain of Custody (CoC) (COC)	Email	ian.gregson@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	ian.gregson@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ian.gregson@ghd.com
- EDI Format - GHDNEW (GHDNEW)	Email	ian.gregson@ghd.com
- EDI Format - XTab (XTAB)	Email	ian.gregson@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ian.gregson@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1716508**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 05-Jul-2017 16:08
Order number	: 2218003	Date Analysis Commenced	: 06-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Jul-2017 16:54
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 10		
No. of samples analysed	: 8		

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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield 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 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.

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.

- Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01	----	----	----	----
				Client sampling date / time	05-Jul-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1716508-005	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1	%		**42.3**	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		**5**	----	----	----	----
Barium	7440-39-3	10	mg/kg		**70**	----	----	----	----
Beryllium	7440-41-7	1	mg/kg		**2**	----	----	----	----
Boron	7440-42-8	50	mg/kg		<50	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		**3**	----	----	----	----
Cobalt	7440-48-4	2	mg/kg		**23**	----	----	----	----
Copper	7440-50-8	5	mg/kg		**17**	----	----	----	----
Lead	7439-92-1	5	mg/kg		**16**	----	----	----	----
Manganese	7439-96-5	5	mg/kg		**244**	----	----	----	----
Nickel	7440-02-0	2	mg/kg		**14**	----	----	----	----
Selenium	7782-49-2	5	mg/kg		<5	----	----	----	----
Vanadium	7440-62-2	5	mg/kg		**12**	----	----	----	----
Zinc	7440-66-6	5	mg/kg		**108**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EK040T: Fluoride Total									
Fluoride	16984-48-8	40	mg/kg		**300**	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01	----	----	----	----
				Client sampling date / time	05-Jul-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1716508-005	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	----	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**83.1**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SED01	----	----	----	----
				Client sampling date / time	05-Jul-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1716508-005	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
2-Chlorophenol-D4	93951-73-6	0.5	%		82.9	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		83.1	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		80.7	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		85.2	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		89.4	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		90.5	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		95.3	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		95.1	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW402	MW64	MW63	MW205	MW400D
				Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716508-001	ES1716508-002	ES1716508-003	ES1716508-004	ES1716508-006
					Result	Result	Result	Result	Result
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		----	150	44	492	330
Total Alkalinity as CaCO3	----	1	mg/L		----	150	44	492	330
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	217	380	1630	240
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	1230	1430	560	1150
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		110	9	13	176	25
Magnesium	7439-95-4	1	mg/L		238	58	144	166	73
Sodium	7440-23-5	1	mg/L		1890	971	1080	982	946
Potassium	7440-09-7	1	mg/L		24	19	22	21	22
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	0.002	0.002
Boron	7440-42-8	0.05	mg/L		0.07	0.12	0.06	0.12	0.06
Barium	7440-39-3	0.001	mg/L		0.054	0.055	0.149	0.013	0.048
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		0.004	0.005	0.004	0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<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		2.11	0.490	2.66	0.059	0.201
Nickel	7440-02-0	0.001	mg/L		0.010	0.058	0.056	0.123	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		0.017	0.053	0.049	0.020	0.008
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		----	1.2	0.5	1.2	0.8
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		----	42.2	49.1	59.6	44.0

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW402	MW64	MW63	MW205	MW400D
				Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716508-001	ES1716508-002	ES1716508-003	ES1716508-004	ES1716508-006
					Result	Result	Result	Result	Result
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		----	47.9	60.0	65.7	49.0
Ionic Balance	----	0.01	%		----	6.36	9.99	4.90	5.31
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
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
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
>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: 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	1330-20-7	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
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	91-57-6	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	83-32-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	208-96-8	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	120-12-7	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW402	MW64	MW63	MW205	MW400D
				Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00	05-Jul-2017 00:00
Compound	CAS Number	LOR	Unit		ES1716508-001	ES1716508-002	ES1716508-003	ES1716508-004	ES1716508-006
					Result	Result	Result	Result	Result
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	218-01-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Coronene	191-07-1	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	206-44-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	86-73-7	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	91-20-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Perylene	198-55-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	85-01-8	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	129-00-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1
^ Sum of PAHs	----	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**84.3**	**83.5**	**79.7**	**83.7**	**89.2**
Toluene-D8	2037-26-5	2	%		**109**	**101**	**87.0**	**92.1**	**108**
4-Bromofluorobenzene	460-00-4	2	%		**113**	**104**	**96.9**	**97.8**	**106**
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**69.1**	**62.3**	**57.6**	**66.8**	**63.4**
Anthracene-d10	1719-06-8	0.1	%		**76.8**	**75.7**	**77.1**	**77.2**	**73.8**
4-Terphenyl-d14	1718-51-0	0.1	%		**83.7**	**80.4**	**80.7**	**80.9**	**70.8**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	MW62	MW6	----	----	----
			Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1716508-007	ES1716508-008	--------	--------	--------
				Result	Result	----	----	----
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	**121**	**382**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**121**	**382**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**376**	**160**	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**328**	**1200**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**8**	**24**	----	----	----
Magnesium	7439-95-4	1	mg/L	**13**	**78**	----	----	----
Sodium	7440-23-5	1	mg/L	**416**	**959**	----	----	----
Potassium	7440-09-7	1	mg/L	**9**	**22**	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.011**	----	----	----
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	----	----	----
Barium	7440-39-3	0.001	mg/L	**0.036**	**0.075**	----	----	----
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	**0.037**	----	----	----
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	**0.061**	**2.48**	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.022**	**0.024**	----	----	----
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	**0.010**	**0.008**	----	----	----
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	**0.6**	**0.7**	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	**19.5**	**44.8**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	MW62	MW6	----	----	----
			Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1716508-007	ES1716508-008	--------	--------	--------
				Result	Result	----	----	----
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	**19.8**	**49.9**	----	----	----
Ionic Balance	----	0.01	%	**0.75**	**5.36**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
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	----	----	----
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	----	----	----
>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: 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**	1330-20-7	2	µg/L	<2	<2	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons								
3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	<0.1	----	----	----
2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	<0.1	----	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	<0.1	----	----	----
Acenaphthene	83-32-9	0.1	µg/L	<0.1	<0.1	----	----	----
Acenaphthylene	208-96-8	0.1	µg/L	<0.1	<0.1	----	----	----
Anthracene	120-12-7	0.1	µg/L	<0.1	<0.1	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW62	MW6	----	----	----
				Client sampling date / time	05-Jul-2017 00:00	05-Jul-2017 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1716508-007	ES1716508-008	--------	--------	--------
					Result	Result	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	<0.1	----	----	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	<0.05	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		<0.1	<0.1	----	----	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	<0.1	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	<0.1	----	----	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	<0.1	----	----	----
Chrysene	218-01-9	0.1	µg/L		<0.1	<0.1	----	----	----
Coronene	191-07-1	0.1	µg/L		<0.1	<0.1	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	<0.1	----	----	----
Fluoranthene	206-44-0	0.1	µg/L		<0.1	<0.1	----	----	----
Fluorene	86-73-7	0.1	µg/L		<0.1	<0.1	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	<0.1	----	----	----
Naphthalene	91-20-3	0.1	µg/L		<0.1	<0.1	----	----	----
Perylene	198-55-0	0.1	µg/L		<0.1	<0.1	----	----	----
Phenanthrene	85-01-8	0.1	µg/L		<0.1	<0.1	----	----	----
Pyrene	129-00-0	0.1	µg/L		<0.1	<0.1	----	----	----
^ Sum of PAHs	----	0.05	µg/L		<0.05	<0.05	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	<0.05	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**94.8**	**86.6**	----	----	----
Toluene-D8	2037-26-5	2	%		**114**	**99.4**	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**111**	**99.0**	----	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**65.4**	**62.7**	----	----	----
Anthracene-d10	1719-06-8	0.1	%		**76.5**	**79.6**	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**85.1**	**85.1**	----	----	----

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

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
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1716508**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 05-Jul-2017
Order number	: 2218003	Date Analysis Commenced	: 06-Jul-2017
C-O-C number	: ----	Issue Date	: 11-Jul-2017
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 10		
No. of samples analysed	: 8		

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 Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield 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: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 983010)									
ES1716448-001	Anonymous	EA055: Moisture Content	----	1	%	15.2	15.4	1.20	0% - 50%
ES1716497-002	Anonymous	EA055: Moisture Content	----	1	%	7.7	7.4	4.03	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 985596)									
ES1716457-005	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	140	110	25.8	0% - 50%
		EG005T: Chromium	7440-47-3	2	mg/kg	20	19	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	9	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	20	30.7	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	102	96	5.96	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	54	53	0.00	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	13	9	31.2	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
ES1716476-001	Anonymous	EG005T: Beryllium	7440-41-7	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Barium	7440-39-3	10	mg/kg	40	40	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	4	0.00	No Limit
		EG005T: Cobalt	7440-48-4	2	mg/kg	2	2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	4	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005T: Total Metals by ICP-AES (QC Lot: 985596) - continued									
ES1716476-001	Anonymous	EG005T: Lead	7439-92-1	5	mg/kg	9	9	0.00	No Limit
		EG005T: Manganese	7439-96-5	5	mg/kg	567	508	11.0	0% - 20%
		EG005T: Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Vanadium	7440-62-2	5	mg/kg	7	8	18.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	29	37	24.2	No Limit
		EG005T: Boron	7440-42-8	50	mg/kg	<50	<50	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 985597)									
ES1716457-005	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1716476-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EK040T: Fluoride Total (QC Lot: 990206)									
EP1707081-001	Anonymous	EK040T: Fluoride	16984-48-8	40	mg/kg	80	90	21.4	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 982710)									
ES1716473-018	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982473)									
ES1716547-025	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982711)									
ES1716473-018	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 982473)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 982473) - continued									
ES1716547-025	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 982711)									
ES1716473-018	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 982473)									
ES1716547-025	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	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 (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 983666)									
ES1716547-009	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	62	61	2.30	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	62	61	2.30	0% - 20%
ES1716462-026	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	6	5	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	6	5	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 983211)									
ES1716366-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	169	168	0.00	0% - 20%
ES1716547-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	21	21	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 983212)									
ES1716366-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1460	1460	0.361	0% - 20%
ES1716547-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	43	42	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 982661)									
ES1716092-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	15	15	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	18	18	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	20	20	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
ES1716369-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	157	159	1.36	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	74	76	2.64	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	198	202	2.25	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	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 (%)
ED093F: Dissolved Major Cations (QC Lot: 982667)									
ES1716508-004	MW205	ED093F: Calcium	7440-70-2	1	mg/L	176	173	1.60	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	166	165	0.675	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	982	977	0.526	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	21	22	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 983264)									
ES1716508-001	MW402	ED093F: Calcium	7440-70-2	1	mg/L	110	109	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	238	236	0.746	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1890	1910	0.691	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	24	24	0.00	0% - 20%
EW1702857-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	9	9	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	17	17	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 982663)									
ES1716301-001	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	0.006	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	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.005	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	0.018	0.00	0% - 50%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.032	0.032	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.072	0.072	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
ES1716369-004	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	0.001	78.0	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	0.080	0.080	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	0.742	0.754	1.49	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

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 (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 982663) - continued									
ES1716369-004	Anonymous	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
EG020F: Dissolved Metals by ICP-MS (QC Lot: 982665)									
ES1716508-004	MW205	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	0.005	97.1	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	0.013	0.013	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	0.059	0.058	2.93	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.123	0.119	2.96	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.020	0.021	5.53	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	0.12	0.11	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 982664)									
ES1716369-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1716369-004	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: 982666)									
ES1716508-006	MW400D	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK040P: Fluoride by PC Titrator (QC Lot: 983665)									
ES1716547-009	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.4	0.4	0.00	No Limit
ES1716462-026	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 982659)									
ES1716508-002	MW64	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 983354)									
ES1716492-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1716504-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 982659)									
ES1716508-002	MW64	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 983354)									
ES1716492-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1716504-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	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: 983354)									
ES1716492-001	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
ES1716504-011	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
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 982658)									
ES1716508-002	MW64	EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Coronene	191-07-1	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Perylene	198-55-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	<0.1	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: **SOIL**

				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
EG005T: Total Metals by ICP-AES (QCLot: 985596)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	99.0	86	126
EG005T: Barium	7440-39-3	10	mg/kg	<10	143 mg/kg	96.3	85	115
EG005T: Beryllium	7440-41-7	1	mg/kg	<1	5.63 mg/kg	109	90	113
EG005T: Boron	7440-42-8	50	mg/kg	<50	----	----	----	----
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	96.0	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	90.3	76	128
EG005T: Cobalt	7440-48-4	2	mg/kg	<2	16 mg/kg	100	88	120
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	98.2	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	95.9	80	114
EG005T: Manganese	7439-96-5	5	mg/kg	<5	130 mg/kg	101	85	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	98.8	87	123
EG005T: Selenium	7782-49-2	5	mg/kg	<5	5.37 mg/kg	92.5	75	131
EG005T: Vanadium	7440-62-2	5	mg/kg	<5	29.6 mg/kg	104	92	122
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	106	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 985597)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.4	70	105
EK040T: Fluoride Total (QCLot: 990206)								
EK040T: Fluoride	16984-48-8	40	mg/kg	<40	950 mg/kg	81.7	67	96
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 982710)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	91.3	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	90.2	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	92.6	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	96.2	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	94.5	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	93.2	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.6	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	98.4	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.4	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	94.9	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	89.0	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	92.0	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	97.3	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	91.7	61	121

Sub-Matrix: **SOIL**

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 982710) - continued								
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	94.8	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	92.4	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982473)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	99.2	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982711)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	95.5	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	102	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	101	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982473)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	99.6	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982711)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	101	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	102	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	91.6	63	131
EP080: BTEXN (QCLot: 982473)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	100	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	98.3	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.9	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	96.5	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	94.3	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.9	63	119

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
ED037P: Alkalinity by PC Titrator (QCLot: 983666)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.7	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 983211)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	90.0	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 983212)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	90.7	81	127
				<1	1000 mg/L	94.4	81	127
ED093F: Dissolved Major Cations (QCLot: 982661)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.3	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.0	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.7	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
ED093F: Dissolved Major Cations (QCLot: 982667)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.6	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.8	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.3	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	85	113
ED093F: Dissolved Major Cations (QCLot: 983264)								
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	96.2	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.1	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.9	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 982663)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.4	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	95.2	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.8	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.7	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	92.9	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.3	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	92.7	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	94.0	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	92.0	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	91.8	83	109
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.1	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	92.3	85	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 982665)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.1	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	95.3	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.5	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	92.9	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	94.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	90.4	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.6	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.4	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	94.2	81	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
EG020F: Dissolved Metals by ICP-MS (QCLot: 982665) - continued								
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	94.2	85	115
EG035F: Dissolved Mercury by FIMS (QCLot: 982664)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	100	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 982666)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	83	105
EK040P: Fluoride by PC Titrator (QCLot: 983665)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	106	82	116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982659)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	97.3	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	86.1	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	90.0	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 983354)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	92.7	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982659)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	85.6	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	82.6	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	99.8	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 983354)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	93.9	75	127
EP080: BTEXN (QCLot: 983354)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	109	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	114	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	107	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	113	70	120
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 982658)								
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	100	60	120
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	74.9	59	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	86.8	36	144
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	94.1	64	122
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	98.9	64	126
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	107	65	127
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	107	64	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	113	64	126

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
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 982658) - continued								
EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	2 µg/L	114	62	126
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	108	62	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	115	56	126
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	108	68	130
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	108	66	130
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	100.0	35	133
EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	117	58	128
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	113	65	127
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	106	64	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	115	57	127
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	87.4	54	128
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	87.2	66	130
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	107	65	129
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	115	66	128

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: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 985596)							
ES1716457-005	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	92.6	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.8	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	107	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	99.6	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.2	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.5	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 985597)							
ES1716457-005	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	101	70	130
EK040T: Fluoride Total (QCLot: 990206)							
EP1707081-001	Anonymous	EK040T: Fluoride	16984-48-8	400 mg/kg	117	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 982710)							
ES1716473-018	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	95.2	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	94.8	70	130

Sub-Matrix: **SOIL**

				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: 982473)							
ES1716547-025	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	122	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982711)							
ES1716473-018	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	95.3	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	110	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	108	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982473)							
ES1716547-025	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	117	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982711)							
ES1716473-018	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	102	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	109	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	115	52	132
EP080: BTEXN (QCLot: 982473)							
ES1716547-025	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	118	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	109	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	110	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	108	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	106	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	95.4	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
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 983211)							
ES1716366-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 983212)							
ES1716366-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 982663)							
ES1716341-008	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	84.3	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	106	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	107	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	105	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	106	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	106	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	105	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: 982663) - continued							
ES1716341-008	Anonymous	EG020A-F: Lead	7439-92-1	1 mg/L	95.0	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	110	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	106	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	102	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	106	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 982665)							
ES1716508-007	MW62	EG020A-F: Arsenic	7440-38-2	1 mg/L	91.5	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	101	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	94.0	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	91.5	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.7	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	93.4	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	92.2	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	89.2	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	96.3	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	90.6	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	99.5	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	92.2	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 982664)							
ES1716369-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	81.0	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 982666)							
ES1716508-004	MW205	EG035F: Mercury	7439-97-6	0.01 mg/L	78.6	70	130
EK040P: Fluoride by PC Titrator (QCLot: 983665)							
ES1716462-026	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	89.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 982659)							
ES1716508-003	MW63	EP071: C10 - C14 Fraction	----	2000 µg/L	83.8	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	96.0	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	106	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 983354)							
ES1716492-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	79.6	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 982659)							
ES1716508-003	MW63	EP071: >C10 - C16 Fraction	----	2500 µg/L	95.3	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	101	77	153
		EP071: >C34 - C40 Fraction	----	1500 µg/L	104	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 983354)							
ES1716492-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	85.4	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: 983354)							
ES1716492-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	80.5	70	130
		EP080: Toluene	108-88-3	25 µg/L	88.1	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	85.0	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	86.2	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	95.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	115	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 982658)							
ES1716508-003	MW63	EP132: 3-Methylcholanthrene	56-49-5	2 µg/L	92.4	59	115
		EP132: 2-Methylnaphthalene	91-57-6	2 µg/L	66.6	46	120
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	2 µg/L	76.2	21	135
		EP132: Acenaphthene	83-32-9	2 µg/L	93.3	62	114
		EP132: Acenaphthylene	208-96-8	2 µg/L	96.7	61	119
		EP132: Anthracene	120-12-7	2 µg/L	112	68	116
		EP132: Benz(a)anthracene	56-55-3	2 µg/L	109	67	122
		EP132: Benzo(a)pyrene	50-32-8	2 µg/L	110	72	114
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	2 µg/L	107	69	119
		EP132: Benzo(e)pyrene	192-97-2	2 µg/L	103	71	119
		EP132: Benzo(g.h.i)perylene	191-24-2	2 µg/L	111	49	133
		EP132: Benzo(k)fluoranthene	207-08-9	2 µg/L	113	71	124
		EP132: Chrysene	218-01-9	2 µg/L	116	70	118
		EP132: Coronene	191-07-1	2 µg/L	112	29	138
		EP132: Dibenz(a.h)anthracene	53-70-3	2 µg/L	112	60	122
		EP132: Fluoranthene	206-44-0	2 µg/L	115	65	121
		EP132: Fluorene	86-73-7	2 µg/L	104	63	118
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	2 µg/L	111	57	123
		EP132: Naphthalene	91-20-3	2 µg/L	82.3	53	115
		EP132: Perylene	198-55-0	2 µg/L	81.1	71	118
		EP132: Phenanthrene	85-01-8	2 µg/L	112	67	120
		EP132: Pyrene	129-00-0	2 µg/L	114	70	117

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1716508**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Telephone	: +61-2-8784 8555
Project	: 2218003 NMH PHASE 2	Date Samples Received	: 05-Jul-2017
Site	: ----	Issue Date	: 11-Jul-2017
Sampler	: BEC ASHLEE	No. of samples received	: 10
Order number	: 2218003	No. of samples analysed	: 8

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

- **NO Quality Control Sample Frequency Outliers exist.**

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	ES1716366--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	ES1716366--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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: **SOIL**

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
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
SED01	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	19-Jul-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
SED01	**05-Jul-2017**	**07-Jul-2017**	01-Jan-2018	✓	**07-Jul-2017**	01-Jan-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
SED01	**05-Jul-2017**	**07-Jul-2017**	02-Aug-2017	✓	**10-Jul-2017**	02-Aug-2017	✓
EK040T: Fluoride Total							
Pulp Bag (EK040T)							
SED01	**05-Jul-2017**	**06-Jul-2017**	02-Aug-2017	✓	**11-Jul-2017**	02-Aug-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**06-Jul-2017**	15-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**06-Jul-2017**	19-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**07-Jul-2017**	15-Aug-2017	✓

Matrix: **SOIL**

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							
Soil Glass Jar - Unpreserved (EP080)							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**06-Jul-2017**	19-Jul-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**07-Jul-2017**	15-Aug-2017	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
SED01	**05-Jul-2017**	**06-Jul-2017**	19-Jul-2017	✓	**06-Jul-2017**	19-Jul-2017	✓

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)							
MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	19-Jul-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	02-Aug-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	02-Aug-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	02-Aug-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	01-Jan-2018	✓

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)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	02-Aug-2017	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**----**	----	----	**06-Jul-2017**	02-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**07-Jul-2017**	12-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**10-Jul-2017**	19-Jul-2017	✓	**10-Jul-2017**	19-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**07-Jul-2017**	12-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**10-Jul-2017**	19-Jul-2017	✓	**10-Jul-2017**	19-Jul-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**10-Jul-2017**	19-Jul-2017	✓	**10-Jul-2017**	19-Jul-2017	✓

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
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132)							
MW402, MW64, MW63, MW205, MW400D, MW62, MW6	**05-Jul-2017**	**07-Jul-2017**	12-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓

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: **SOIL**

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)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Fluoride	EK040T	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	9	11.11	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	
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
Dissolved Mercury by FIMS	EG035F	3	24	12.50	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 Duplicates (DUP) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	3	27	**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	5	39	**12.82**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	7	**14.29**	**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 - Semivolatile Fraction	EP071	1	7	**14.29**	**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	1	20	**5.00**	**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
Dissolved Mercury by FIMS	EG035F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	**7.41**	**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	3	39	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	7	**14.29**	**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 - Semivolatile Fraction	EP071	1	7	**14.29**	**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
Dissolved Mercury by FIMS	EG035F	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	**7.41**	**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	3	39	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	7	**14.29**	**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 - Semivolatile Fraction	EP071	1	7	**14.29**	**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	2	24	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	27	**7.41**	**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
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	7	**14.29**	**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 - Semivolatile Fraction	EP071	1	7	**14.29**	**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
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	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. Mercury in solids are determined following an appropriate acid digestion. 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 Fluoride	EK040T	SOIL	(In-house) Total fluoride is determined by ion specific electrode (ISE) in a solution obtained after a Sodium Carbonate / Potassium Carbonate fusion dissolution.
TRH - Semivolatile Fraction	EP071	SOIL	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 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
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

Analytical Methods	Method	Matrix	Method Descriptions
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.
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 - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
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)
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	WATER	In house: Referenced to USEPA 3640 (GPC Cleanup), 8270D GCMS Capiliary column, SIM mode. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Total Fluoride	EK040T-PR	SOIL	In house: Samples are fused with Sodium Carbonate / Potassium Carbonate flux.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
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 60mL 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.
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	WATER	In house: Referenced to USEPA 3510 (Extraction) / In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace 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.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Health Infrastructure	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle GHD		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / N/A
PROJECT: NMH Phase 2 **PROJECT NO** 2218003	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes / No / N/A
ORDER NUMBER: **PURCHASE ORDER NO.:** 2218003	**COUNTRY OF ORIGIN:**	OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: 2.6 °C
PROJECT MANAGER: Ian Gregson **CONTACT PH:** 49799999			Other comment:
SAMPLER: Bec Ashlee **SAMPLER MOBILE:** 0432700322			
COC Emailed to ALS? (YES / NO) **EDD FORMAT (or default):** ESDAT			
Email Reports to (will default to PM if no other addresses are listed): ian.gregson@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): ian.gregson@ghd.com			

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Bec Ashlee			P. Tran
DATE/TIME: 5.7.17 1610	DATE/TIME: 5/7/17 16:10	DATE/TIME: 5/7/17 17:00	DATE/TIME: 5/7/17 7:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH/ BTEX / PAH (Ultra trace PAH)	Suite M3	Major Ions	HOLD	S-7	S-3	Fluoride	PAH (standard PAH)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW402	5.7.17	W		4	X	X	X				X		HOLD
2	MW64				5	X	X	X				X		
3	MW63				5	X	X	X				X		
4	MW205				5	X	X	X				X		
5	SED01		S		1					X	X	X	X	
6	MW4002		W		5	X	X	X				X		
7	MW62				5	X	X	X				X		
8	MW6				5	X	X	X				X		
9	TS02													X
10	TB02													X
				TOTAL	35									

Environmental Division Sydney
Work Order Reference
ES1716508

Telephone : +61-2-8784 8555

E-MAILED

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1716508**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ian.gregson@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Facsimile	: +61 7979 9988	Facsimile	: +61-2-8784 8500
Project	: 2218003 NMH PHASE 2	Page	: 1 of 3
Order number	: 2218003	Quote number	: ES2015GHDSER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BEC ASHLEE		

Dates

Date Samples Received	: 05-Jul-2017 16:08	Issue Date	: 06-Jul-2017
Client Requested Due Date	: 11-Jul-2017	Scheduled Reporting Date	: **11-Jul-2017**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 2.6 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 8

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
- **Due to natural bottle not being supplied for sample MW402, unable to conduct Major Anions and Fluoride.**
- **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).**
- **Total Fluoride analysis will be conducted by ALS Newcastle.**
- 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 (14 days), Solid (60 days) from date of completion of work order.

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: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - S-03 15 Metals (NEPM 2013 Suite - incl. Digestion)	SOIL - S-07 TRH/BTEXN/PAH (SIM)
ES1716508-005	05-Jul-2017 00:00	SED01	✓	✓

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EK040T Total Fluoride
ES1716508-005	05-Jul-2017 00:00	SED01	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP132(PAH) Ultra Trace Polynuclear Aromatic Compounds	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-04 TRH/BTEXN
ES1716508-001	05-Jul-2017 00:00	MW402	✓		✓	✓	✓
ES1716508-002	05-Jul-2017 00:00	MW64	✓	✓		✓	✓
ES1716508-003	05-Jul-2017 00:00	MW63	✓	✓		✓	✓
ES1716508-004	05-Jul-2017 00:00	MW205	✓	✓		✓	✓

			WATER - EP132(PAH) Ultra Trace Polynuclear Aromatic Compounds	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-04 TRH/BTEXN
ES1716508-006	05-Jul-2017 00:00	MW400D	✓	✓		✓	✓
ES1716508-007	05-Jul-2017 00:00	MW62	✓	✓		✓	✓
ES1716508-008	05-Jul-2017 00:00	MW6	✓	✓		✓	✓

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) WATER No analysis requested
ES1716508-009	05-Jul-2017 00:00	TS02	✓
ES1716508-010	05-Jul-2017 00:00	TB02	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

IAN GREGSON

- *AU Certificate of Analysis - NATA (COA)	Email	ian.gregson@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ian.gregson@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ian.gregson@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ian.gregson@ghd.com
- Chain of Custody (CoC) (COC)	Email	ian.gregson@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	ian.gregson@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ian.gregson@ghd.com
- EDI Format - GHDNEW (GHDNEW)	Email	ian.gregson@ghd.com
- EDI Format - XTab (XTAB)	Email	ian.gregson@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ian.gregson@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1716568**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 06-Jul-2017 11:43
Order number	: ----	Date Analysis Commenced	: 07-Jul-2017
C-O-C number	: ----	Issue Date	: 12-Jul-2017 17:38
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 4		
No. of samples analysed	: 3		

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
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 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.

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.

- Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW404S	MW404D	FD02	----	----
				Client sampling date / time	06-Jul-2017 00:00	06-Jul-2017 00:00	06-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1716568-001	ES1716568-002	ES1716568-003	--------	--------
					Result	Result	Result	----	----
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		**154**	**207**	**202**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**154**	**207**	**202**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**3320**	**506**	**677**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1930**	**1160**	**1160**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**248**	**42**	**42**	----	----
Magnesium	7439-95-4	1	mg/L		**508**	**96**	**95**	----	----
Sodium	7440-23-5	1	mg/L		**1980**	**1010**	**1000**	----	----
Potassium	7440-09-7	1	mg/L		**37**	**18**	**18**	----	----
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		**1.50**	<0.05	<0.05	----	----
Barium	7440-39-3	0.001	mg/L		**0.020**	**0.026**	**0.028**	----	----
Beryllium	7440-41-7	0.001	mg/L		**0.003**	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L		**0.0008**	<0.0001	<0.0001	----	----
Cobalt	7440-48-4	0.001	mg/L		**0.521**	<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	**0.002**	**0.002**	----	----
Manganese	7439-96-5	0.001	mg/L		**34.4**	**0.058**	**0.063**	----	----
Nickel	7440-02-0	0.001	mg/L		**0.228**	**0.040**	**0.040**	----	----
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		**1.16**	**0.024**	**0.025**	----	----
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		**3.3**	**0.9**	**0.9**	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**127**	**47.4**	**50.8**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW404S	MW404D	FD02	----	----
				Client sampling date / time	06-Jul-2017 00:00	06-Jul-2017 00:00	06-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1716568-001	ES1716568-002	ES1716568-003	--------	--------
					Result	Result	Result	----	----
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		**141**	**54.4**	**53.9**	**----**	**----**
Ionic Balance	----	0.01	%		**5.45**	**6.87**	**2.88**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	**----**	**----**
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	**----**	**----**
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	**----**	**----**
>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: 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**	1330-20-7	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	**----**	**----**
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**
2-Methylnaphthalene	91-57-6	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**
Acenaphthene	83-32-9	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**
Acenaphthylene	208-96-8	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**
Anthracene	120-12-7	0.1	µg/L		<0.1	<0.1	<0.1	**----**	**----**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW404S	MW404D	FD02	----	----
				Client sampling date / time	06-Jul-2017 00:00	06-Jul-2017 00:00	06-Jul-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1716568-001	ES1716568-002	ES1716568-003	--------	--------
					Result	Result	Result	----	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Chrysene	218-01-9	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Coronene	191-07-1	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Fluoranthene	206-44-0	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Fluorene	86-73-7	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Naphthalene	91-20-3	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Perylene	198-55-0	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Phenanthrene	85-01-8	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Pyrene	129-00-0	0.1	µg/L		<0.1	<0.1	<0.1	----	----
^ Sum of PAHs	----	0.05	µg/L		<0.05	<0.05	<0.05	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**113**	**119**	**115**	----	----
Toluene-D8	2037-26-5	2	%		**106**	**106**	**104**	----	----
4-Bromofluorobenzene	460-00-4	2	%		**82.6**	**87.9**	**85.1**	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**68.5**	**65.0**	**69.0**	----	----
Anthracene-d10	1719-06-8	0.1	%		**84.5**	**78.1**	**80.0**	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**88.7**	**81.5**	**87.0**	----	----

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
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1716568**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 06-Jul-2017
Order number	: ----	Date Analysis Commenced	: 07-Jul-2017
C-O-C number	: ----	Issue Date	: 12-Jul-2017
Sampler	: BEC ASHLEE		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 4		
No. of samples analysed	: 3		

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
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

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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 (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 985527)									
ES1716568-001	MW404S	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	154	159	2.77	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	154	159	2.77	0% - 20%
ES1716586-001	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	86	81	6.63	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	86	81	6.63	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 985453)									
ES1716557-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	34	30	10.7	0% - 20%
ES1716656-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	147	162	9.49	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 985452)									
ES1716557-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	35	35	0.00	0% - 20%
ES1716656-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	178	178	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 985861)									
ES1716548-016	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	72	71	1.62	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	127	128	1.48	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	447	483	7.75	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
ES1716568-002	MW404D	ED093F: Calcium	7440-70-2	1	mg/L	42	42	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	96	96	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1010	1010	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	18	18	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 985860)									

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: 985860) - continued									
ES1716548-014	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	0.552	0.556	0.719	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	0.011	0.011	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	0.982	0.997	1.47	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.020	0.020	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
ES1716548-024	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	0.262	0.260	0.591	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	0.053	0.052	0.00	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	2.87	2.84	0.870	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.028	0.028	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.033	0.031	5.70	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	0.06	0.06	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 985859)									
ES1716548-015	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1716548-023	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: 985528)									
ES1716643-005	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.8	0.8	0.00	No Limit
ES1716586-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.0	1.0	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 984610)									
ES1716568-001	MW404S	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 986515)									

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: 986515) - continued									
ES1716366-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1716489-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 984610)									
ES1716568-001	MW404S	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 986515)									
ES1716366-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1716489-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 986515)									
ES1716366-001	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
ES1716489-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	4	3	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
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 984592)									
ES1716568-001	MW404S	EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Coronene	191-07-1	0.1	µg/L	<0.1	<0.1	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 (%)*
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 984592) - continued									
ES1716568-001	MW404S	EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Perylene	198-55-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	<0.1	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
ED037P: Alkalinity by PC Titrator (QCLot: 985527)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.8	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 985453)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 985452)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.5	81	127
				<1	1000 mg/L	90.4	81	127
ED093F: Dissolved Major Cations (QCLot: 985861)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.2	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100.0	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.8	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	98.0	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 985860)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.5	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	90.1	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	90.2	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	94.0	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.2	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.1	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	92.6	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	88.3	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.9	85	115
EG035F: Dissolved Mercury by FIMS (QCLot: 985859)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	83	105
EK040P: Fluoride by PC Titrator (QCLot: 985528)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	105	82	116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 984610)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	91.7	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	95.0	83	109

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: 984610) - continued								
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	95.2	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 986515)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	89.8	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 984610)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	98.3	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	89.7	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	101	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 986515)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.5	75	127
EP080: BTEXN (QCLot: 986515)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	84.2	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	81.6	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	83.3	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	83.8	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	84.3	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.1	70	120
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 984592)								
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	95.0	60	120
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	66.5	59	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	75.7	36	144
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	96.3	64	122
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	99.5	64	126
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	120	65	127
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	118	64	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	118	64	126
EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	2 µg/L	117	62	126
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	111	62	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	120	56	126
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	123	68	130
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	120	66	130
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	117	35	133
EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	122	58	128
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	122	65	127
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	109	64	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	120	57	127
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	82.6	54	128

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
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 984592) - continued								
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	87.5	66	130
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	118	65	129
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	121	66	128

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: 985453)							
ES1716557-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	73.6	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 985452)							
ES1716557-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	119	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 985860)							
ES1716548-015	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	112	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	108	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	98.5	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	120	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	117	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	106	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	103	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	105	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	108	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	124	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	92.0	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 985859)							
ES1716548-014	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	91.0	70	130
EK040P: Fluoride by PC Titrator (QCLot: 985528)							
ES1716568-001	MW404S	EK040P: Fluoride	16984-48-8	5 mg/L	74.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 984610)							
ES1716568-002	MW404D	EP071: C10 - C14 Fraction	----	2000 µg/L	103	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	101	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	108	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 986515)							

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: 986515) - continued							
ES1716366-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	120	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 984610)							
ES1716568-002	MW404D	EP071: >C10 - C16 Fraction	----	2500 µg/L	89.2	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	94.8	77	153
		EP071: >C34 - C40 Fraction	----	1500 µg/L	105	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 986515)							
ES1716366-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	118	70	130
EP080: BTEXN (QCLot: 986515)							
ES1716366-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	99.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	95.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	104	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	107	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	113	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 984592)							
ES1716568-002	MW404D	EP132: 3-Methylcholanthrene	56-49-5	2 µg/L	93.8	59	115
		EP132: 2-Methylnaphthalene	91-57-6	2 µg/L	65.1	46	120
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	2 µg/L	77.6	21	135
		EP132: Acenaphthene	83-32-9	2 µg/L	85.8	62	114
		EP132: Acenaphthylene	208-96-8	2 µg/L	93.7	61	119
		EP132: Anthracene	120-12-7	2 µg/L	116	68	116
		EP132: Benz(a)anthracene	56-55-3	2 µg/L	104	67	122
		EP132: Benzo(a)pyrene	50-32-8	2 µg/L	# 115	72	114
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	2 µg/L	114	69	119
		EP132: Benzo(e)pyrene	192-97-2	2 µg/L	108	71	119
		EP132: Benzo(g.h.i)perylene	191-24-2	2 µg/L	114	49	133
		EP132: Benzo(k)fluoranthene	207-08-9	2 µg/L	111	71	124
		EP132: Chrysene	218-01-9	2 µg/L	107	70	118
		EP132: Coronene	191-07-1	2 µg/L	88.3	29	138
		EP132: Dibenz(a.h)anthracene	53-70-3	2 µg/L	113	60	122
		EP132: Fluoranthene	206-44-0	2 µg/L	118	65	121
		EP132: Fluorene	86-73-7	2 µg/L	100	63	118
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	2 µg/L	116	57	123
		EP132: Naphthalene	91-20-3	2 µg/L	78.5	53	115
		EP132: Perylene	198-55-0	2 µg/L	77.1	71	118
		EP132: Phenanthrene	85-01-8	2 µg/L	117	67	120

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*
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 984592) - continued							
ES1716568-002	MW404D	EP132: Pyrene	129-00-0	2 µg/L	117	70	117

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1716568**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 06-Jul-2017
Site	: ----	Issue Date	: 12-Jul-2017
Sampler	: BEC ASHLEE	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 3

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

- **NO Quality Control Sample Frequency Outliers exist.**

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							
EP132B: Polynuclear Aromatic Hydrocarbons	ES1716568--002	MW404D	**Benzo(a)pyrene**	50-32-8	115 %	72-114%	**Recovery greater than upper data quality objective**

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**07-Jul-2017**	20-Jul-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**07-Jul-2017**	03-Aug-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**07-Jul-2017**	03-Aug-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**08-Jul-2017**	03-Aug-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**08-Jul-2017**	02-Jan-2018	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**11-Jul-2017**	03-Aug-2017	✓

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)							
MW404S, MW404D, FD02	**06-Jul-2017**	**----**	----	----	**07-Jul-2017**	03-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW404S, MW404D, FD02	**06-Jul-2017**	**07-Jul-2017**	13-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW404S, MW404D, FD02	**06-Jul-2017**	**10-Jul-2017**	20-Jul-2017	✓	**10-Jul-2017**	20-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW404S, MW404D, FD02	**06-Jul-2017**	**07-Jul-2017**	13-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW404S, MW404D, FD02	**06-Jul-2017**	**10-Jul-2017**	20-Jul-2017	✓	**10-Jul-2017**	20-Jul-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW404S, MW404D, FD02	**06-Jul-2017**	**10-Jul-2017**	20-Jul-2017	✓	**10-Jul-2017**	20-Jul-2017	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132)							
MW404S, MW404D, FD02	**06-Jul-2017**	**07-Jul-2017**	13-Jul-2017	✓	**10-Jul-2017**	16-Aug-2017	✓

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	14	**14.29**	**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
Dissolved Mercury by FIMS	EG035F	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	**11.76**	**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	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	3	**33.33**	**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 - Semivolatile Fraction	EP071	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	1	14	**7.14**	**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
Dissolved Mercury by FIMS	EG035F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**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	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	3	**33.33**	**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 - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**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
Dissolved Mercury by FIMS	EG035F	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**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	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	3	**33.33**	**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 - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**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	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	**5.88**	**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

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							
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	3	**33.33**	**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 - Semivolatile Fraction	EP071	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**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
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.
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 - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

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)
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	WATER	In house: Referenced to USEPA 3640 (GPC Cleanup), 8270D GCMS Capiliary column, SIM mode. This method is compliant with NEPM (2013) Schedule B(3)

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 60mL 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.
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	WATER	In house: Referenced to USEPA 3510 (Extraction) / In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace 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.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph 02 4014 2500 E samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph 02 4423 2063 E nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph 08 9209 7655 E samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph 02 8784 8555 E samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph 07 4796 0600 E townsville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph 02 4225 3125 E wollongong@alsglobal.com

CLIENT: Health Infrastructure
OFFICE:
PROJECT: 2218003 PROJECT NO.:
ORDER NUMBER: PURCHASE ORDER NO.:
PROJECT MANAGER: Ian Gregson CONTACT PH: 49799999
SAMPLER: Bec Ashlee SAMPLER MOBILE: 0432 700 322
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): ian.gregson@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)
☑ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: (1) 2 3 4 5 6 7
OF: (1) 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes (No)
Free ice / frozen ice bricks present upon receipt? Yes (No)
Random Sample Temperature on Receipt: 10.2 °C
Other comment:

RELINQUISHED BY: Bec Ashlee
DATE/TIME: 6.7.17 1145

RECEIVED BY: KH
DATE/TIME: 6/7/17 11.45am

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: P Tan
DATE/TIME: 6/7/17 7:30pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH/BTEX	PAH ultra trace	W-3	Major ions	Flouride	HOLD			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW404S	6.7.17	W		5	X	X	X	X	X				
	~~MW404~~													
2	MW404D				5	X	X	X	X	X				
3	FD02				5	X	X	X	X	X				
4	RB02				3						X			
				TOTAL	18									

RECEIVED

E-MAILED

Environmental Division
Sydney
Work Order Reference
ES1716568

Telephone: + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1716568**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ian.gregson@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Facsimile	: +61 7979 9988	Facsimile	: +61-2-8784 8500
Project	: 2218003	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHDSER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BEC ASHLEE		

Dates

Date Samples Received	: 06-Jul-2017 11:43	Issue Date	: 06-Jul-2017
Client Requested Due Date	: 12-Jul-2017	Scheduled Reporting Date	: **12-Jul-2017**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 10.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 3

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 (14 days), Solid (60 days) from date of completion of work order.

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	(On Hold) WATER No analysis requested	WATER - EP132(PAH) Ultra Trace Polynuclear Aromatic Compounds	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-04 TRH/BTEXN
ES1716568-001	06-Jul-2017 00:00	MW404S		✓	✓	✓	✓
ES1716568-002	06-Jul-2017 00:00	MW404D		✓	✓	✓	✓
ES1716568-003	06-Jul-2017 00:00	FD02		✓	✓	✓	✓
ES1716568-004	06-Jul-2017 00:00	RB02	✓				

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

IAN GREGSON

- *AU Certificate of Analysis - NATA (COA)	Email	ian.gregson@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ian.gregson@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ian.gregson@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ian.gregson@ghd.com
- A4 - AU Tax Invoice (INV)	Email	ian.gregson@ghd.com
- Chain of Custody (CoC) (COC)	Email	ian.gregson@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	ian.gregson@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ian.gregson@ghd.com
- EDI Format - GHDNEW (GHDNEW)	Email	ian.gregson@ghd.com
- EDI Format - XTab (XTAB)	Email	ian.gregson@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ian.gregson@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1716747**	Page	: 1 of 6
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 07-Jul-2017 14:03
Order number	: ----	Date Analysis Commenced	: 10-Jul-2017
C-O-C number	: ----	Issue Date	: 13-Jul-2017 18:08
Sampler	: KASEY WILLIAMS		
Site	: ----		
Quote number	: EN/005/16		
No. of samples received	: 4		
No. of samples analysed	: 4		

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
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	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 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.

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.

- Ionic Balance out of acceptable limits for sample 4 due to analytes not quantified in this report.
- Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW61	SW501	SW502	SW506	----
				Client sampling date / time	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1716747-001	ES1716747-002	ES1716747-003	ES1716747-004	--------
					Result	Result	Result	Result	----
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		17	33	63	5	----
Total Alkalinity as CaCO3	----	1	mg/L		17	33	63	5	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		269	133	119	150	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		123	122	132	74	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		3	22	18	10	----
Magnesium	7439-95-4	1	mg/L		10	19	19	18	----
Sodium	7440-23-5	1	mg/L		188	110	116	93	----
Potassium	7440-09-7	1	mg/L		6	5	6	5	----
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		0.07	0.25	0.25	0.08	----
Barium	7440-39-3	0.001	mg/L		0.005	0.025	0.025	0.030	----
Beryllium	7440-41-7	0.001	mg/L		0.010	<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		0.054	0.004	<0.001	0.003	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		0.003	0.012	0.002	0.003	----
Manganese	7439-96-5	0.001	mg/L		0.131	0.135	0.011	0.048	----
Nickel	7440-02-0	0.001	mg/L		0.041	0.013	0.003	0.016	----
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		0.089	0.119	0.009	0.191	----
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		0.5	0.9	1.1	0.4	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		9.41	6.87	7.46	5.31	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW61	SW501	SW502	SW506	----
				Client sampling date / time	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1716747-001	ES1716747-002	ES1716747-003	ES1716747-004	--------
					Result	Result	Result	Result	----
EN055: Ionic Balance - Continued									
Total Cations	----	0.01	meq/L		**9.30**	**7.57**	**7.66**	**6.15**	----
Ionic Balance	----	0.01	%		**0.57**	**4.88**	**1.33**	**7.36**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	----
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	----
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	----
>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: 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**	1330-20-7	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	----
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
2-Methylnaphthalene	91-57-6	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Acenaphthene	83-32-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Acenaphthylene	208-96-8	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Anthracene	120-12-7	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW61	SW501	SW502	SW506	----
				Client sampling date / time	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	07-Jul-2017 00:00	----
Compound	CAS Number	LOR	Unit		ES1716747-001	ES1716747-002	ES1716747-003	ES1716747-004	--------
					Result	Result	Result	Result	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Chrysene	218-01-9	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Coronene	191-07-1	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Fluoranthene	206-44-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Fluorene	86-73-7	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Naphthalene	91-20-3	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Perylene	198-55-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Phenanthrene	85-01-8	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
Pyrene	129-00-0	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	----
^ Sum of PAHs	----	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**107**	**112**	**106**	**113**	----
Toluene-D8	2037-26-5	2	%		**99.3**	**104**	**94.8**	**98.8**	----
4-Bromofluorobenzene	460-00-4	2	%		**93.8**	**97.1**	**90.9**	**95.1**	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**65.2**	**65.2**	**69.0**	**72.0**	----
Anthracene-d10	1719-06-8	0.1	%		**81.0**	**76.5**	**76.4**	**78.0**	----
4-Terphenyl-d14	1718-51-0	0.1	%		**87.3**	**84.5**	**86.4**	**75.3**	----

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
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1716747**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 07-Jul-2017
Order number	: ----	Date Analysis Commenced	: 10-Jul-2017
C-O-C number	: ----	Issue Date	: 13-Jul-2017
Sampler	: KASEY WILLIAMS		
Site	: ----		
Quote number	: EN/005/16		
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*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

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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 (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 987913)									
ES1716700-021	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	142	138	3.28	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	142	138	3.28	0% - 20%
ES1716763-001	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	1150	1180	3.18	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1150	1180	3.18	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 987664)									
ES1716747-001	MW61	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	269	257	4.48	0% - 20%
ES1716756-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	512	501	2.29	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 987665)									
ES1716747-001	MW61	ED045G: Chloride	16887-00-6	1	mg/L	123	123	0.00	0% - 20%
ES1716756-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1340	1350	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 989029)									
ES1716740-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	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	39	38	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
ES1716725-001	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	11	11	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 989033)									

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 (%)
ED093F: Dissolved Major Cations (QC Lot: 989033) - continued									
ES1716905-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	6	5	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	19	18	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 989030)									
ES1716740-003	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	0.023	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	<0.001	<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	0.015	0.016	7.42	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
ES1716725-001	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	0.003	0.003	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	0.002	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
		EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 989032)									
ES1716747-002	SW501	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	0.025	0.026	4.67	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	0.004	0.003	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 (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 989032) - continued									
ES1716747-002	SW501	EG020A-F: Copper	7440-50-8	0.001	mg/L	0.012	0.011	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	0.135	0.143	5.74	0% - 20%
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.013	0.012	11.4	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.119	0.120	1.10	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	0.25	0.25	0.00	No Limit
ES1716905-003	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	0.010	0.010	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	0.020	0.019	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	0.013	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
EG035F: Dissolved Mercury by FIMS (QC Lot: 989031)									
ES1716725-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1716740-006	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: 987912)									
ES1716700-021	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1716763-001	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	0.6	0.6	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 987024)									
ES1716747-001	MW61	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 987362)									
ES1716607-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	40	0.00	No Limit
ES1716621-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 987024)									
ES1716747-001	MW61	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	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 (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 987362)									
ES1716607-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1716621-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 987362)									
ES1716607-001	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
ES1716621-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	5	5	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
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 987023)									
ES1716747-001	MW61	EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Coronene	191-07-1	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Perylene	198-55-0	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	<0.1	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 (%)*
EP132B: Polynuclear Aromatic Hydrocarbons (QC Lot: 987023) - continued									
ES1716747-001	MW61	EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	<0.1	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
ED037P: Alkalinity by PC Titrator (QCLot: 987913)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.2	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 987664)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 987665)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	81	127
				<1	1000 mg/L	91.2	81	127
ED093F: Dissolved Major Cations (QCLot: 989029)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	91.3	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.8	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.2	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.3	85	113
ED093F: Dissolved Major Cations (QCLot: 989033)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	89.6	80	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	93.9	90	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	93.0	82	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.7	85	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 989030)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	94.1	85	115
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	94.4	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	90.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	93.5	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	91.1	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.4	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.3	85	115
EG020A-F: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	96.7	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	94.7	85	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 989032)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.2	85	114
EG020A-F: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	93.7	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: 989032) - continued								
EG020A-F: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	93.0	82	110
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.3	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.0	85	111
EG020A-F: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	91.5	82	112
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.3	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.7	83	111
EG020A-F: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	88.0	82	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	87.6	82	112
EG020A-F: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	95.7	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	90.8	81	117
EG020A-F: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	91.0	85	115
EG035F: Dissolved Mercury by FIMS (QCLot: 989031)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.6	83	105
EK040P: Fluoride by PC Titrator (QCLot: 987912)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	114	82	116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 987024)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	88.8	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.6	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	89.0	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 987362)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	80.5	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 987024)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	95.7	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	92.3	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 987362)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.6	75	127
EP080: BTEXN (QCLot: 987362)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.8	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	106	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	110	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	112	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	116	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	96.7	70	120
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 987023)								
EP132: 3-Methylcholanthrene	56-49-5	0.1	µg/L	<0.1	2 µg/L	87.4	60	120

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
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 987023) - continued								
EP132: 2-Methylnaphthalene	91-57-6	0.1	µg/L	<0.1	2 µg/L	66.1	59	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L	<0.1	2 µg/L	76.0	36	144
EP132: Acenaphthene	83-32-9	0.1	µg/L	<0.1	2 µg/L	92.2	64	122
EP132: Acenaphthylene	208-96-8	0.1	µg/L	<0.1	2 µg/L	94.5	64	126
EP132: Anthracene	120-12-7	0.1	µg/L	<0.1	2 µg/L	110	65	127
EP132: Benz(a)anthracene	56-55-3	0.1	µg/L	<0.1	2 µg/L	105	64	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	106	64	126
EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.1	µg/L	<0.1	2 µg/L	104	62	126
EP132: Benzo(e)pyrene	192-97-2	0.1	µg/L	<0.1	2 µg/L	99.1	62	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.1	µg/L	<0.1	2 µg/L	111	56	126
EP132: Benzo(k)fluoranthene	207-08-9	0.1	µg/L	<0.1	2 µg/L	108	68	130
EP132: Chrysene	218-01-9	0.1	µg/L	<0.1	2 µg/L	111	66	130
EP132: Coronene	191-07-1	0.1	µg/L	<0.1	2 µg/L	116	35	133
EP132: Dibenz(a.h)anthracene	53-70-3	0.1	µg/L	<0.1	2 µg/L	113	58	128
EP132: Fluoranthene	206-44-0	0.1	µg/L	<0.1	2 µg/L	108	65	127
EP132: Fluorene	86-73-7	0.1	µg/L	<0.1	2 µg/L	103	64	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L	<0.1	2 µg/L	112	57	127
EP132: Naphthalene	91-20-3	0.1	µg/L	<0.1	2 µg/L	79.7	54	128
EP132: Perylene	198-55-0	0.1	µg/L	<0.1	2 µg/L	77.7	66	130
EP132: Phenanthrene	85-01-8	0.1	µg/L	<0.1	2 µg/L	109	65	129
EP132: Pyrene	129-00-0	0.1	µg/L	<0.1	2 µg/L	107	66	128

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: 987664)							
ES1716747-001	MW61	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 987665)							
ES1716747-001	MW61	ED045G: Chloride	16887-00-6	250 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 989030)							
ES1716737-001	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	91.6	70	130
		EG020A-F: Beryllium	7440-41-7	1 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: 989030) - continued							
ES1716737-001	Anonymous	EG020A-F: Barium	7440-39-3	1 mg/L	96.1	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	97.4	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	97.6	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	# Not Determined	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	97.8	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	102	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.3	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	99.3	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	96.5	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 989032)							
ES1716747-003	SW502	EG020A-F: Arsenic	7440-38-2	1 mg/L	104	70	130
		EG020A-F: Beryllium	7440-41-7	1 mg/L	109	70	130
		EG020A-F: Barium	7440-39-3	1 mg/L	106	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	107	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	109	70	130
		EG020A-F: Cobalt	7440-48-4	1 mg/L	106	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	106	70	130
		EG020A-F: Manganese	7439-96-5	1 mg/L	108	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-F: Vanadium	7440-62-2	1 mg/L	109	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	108	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 989031)							
ES1716725-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	86.0	70	130
EK040P: Fluoride by PC Titrator (QCLot: 987912)							
ES1716700-020	Anonymous	EK040P: Fluoride	16984-48-8	5 mg/L	105	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 987024)							
ES1716747-002	SW501	EP071: C10 - C14 Fraction	----	2000 µg/L	112	74	150
		EP071: C15 - C28 Fraction	----	2500 µg/L	107	77	153
		EP071: C29 - C36 Fraction	----	2000 µg/L	116	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 987362)							
ES1716607-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	121	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 987024)							
ES1716747-002	SW501	EP071: >C10 - C16 Fraction	----	2500 µg/L	106	74	150
		EP071: >C16 - C34 Fraction	----	3500 µg/L	112	77	153

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: 987024) - continued							
ES1716747-002	SW501	EP071: >C34 - C40 Fraction	----	1500 µg/L	116	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 987362)							
ES1716607-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	126	70	130
EP080: BTEXN (QCLot: 987362)							
ES1716607-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	100	70	130
		EP080: Toluene	108-88-3	25 µg/L	103	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	108	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	101	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	112	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	106	70	130
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 987023)							
ES1716747-002	SW501	EP132: 3-Methylcholanthrene	56-49-5	2 µg/L	95.4	59	115
		EP132: 2-Methylnaphthalene	91-57-6	2 µg/L	67.6	46	120
		EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	2 µg/L	72.6	21	135
		EP132: Acenaphthene	83-32-9	2 µg/L	94.0	62	114
		EP132: Acenaphthylene	208-96-8	2 µg/L	93.5	61	119
		EP132: Anthracene	120-12-7	2 µg/L	114	68	116
		EP132: Benz(a)anthracene	56-55-3	2 µg/L	109	67	122
		EP132: Benzo(a)pyrene	50-32-8	2 µg/L	109	72	114
		EP132: Benzo(b+j)fluoranthene	205-99-2 205-82-3	2 µg/L	105	69	119
		EP132: Benzo(e)pyrene	192-97-2	2 µg/L	102	71	119
		EP132: Benzo(g.h.i)perylene	191-24-2	2 µg/L	118	49	133
		EP132: Benzo(k)fluoranthene	207-08-9	2 µg/L	110	71	124
		EP132: Chrysene	218-01-9	2 µg/L	116	70	118
		EP132: Coronene	191-07-1	2 µg/L	116	29	138
		EP132: Dibenz(a.h)anthracene	53-70-3	2 µg/L	119	60	122
		EP132: Fluoranthene	206-44-0	2 µg/L	110	65	121
		EP132: Fluorene	86-73-7	2 µg/L	106	63	118
		EP132: Indeno(1.2.3.cd)pyrene	193-39-5	2 µg/L	117	57	123
		EP132: Naphthalene	91-20-3	2 µg/L	83.1	53	115
		EP132: Perylene	198-55-0	2 µg/L	80.7	71	118
		EP132: Phenanthrene	85-01-8	2 µg/L	113	67	120
		EP132: Pyrene	129-00-0	2 µg/L	108	70	117

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1716747**	Page	: 1 of 7
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Telephone	: +61-2-8784 8555
Project	: 2218003	Date Samples Received	: 07-Jul-2017
Site	: ----	Issue Date	: 13-Jul-2017
Sampler	: KASEY WILLIAMS	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.**
- **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

- **NO Quality Control Sample Frequency Outliers exist.**

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	ES1716747--001	MW61	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EG020F: Dissolved Metals by ICP-MS	ES1716737--001	Anonymous	**Copper**	7440-50-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**10-Jul-2017**	21-Jul-2017	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**10-Jul-2017**	04-Aug-2017	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**10-Jul-2017**	04-Aug-2017	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**11-Jul-2017**	04-Aug-2017	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**11-Jul-2017**	03-Jan-2018	✓

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)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**12-Jul-2017**	04-Aug-2017	✓
EK040P: Fluoride by PC Titrator							
Clear Plastic Bottle - Natural (EK040P)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**----**	----	----	**10-Jul-2017**	04-Aug-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**10-Jul-2017**	14-Jul-2017	✓	**11-Jul-2017**	19-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**11-Jul-2017**	21-Jul-2017	✓	**11-Jul-2017**	21-Jul-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**10-Jul-2017**	14-Jul-2017	✓	**11-Jul-2017**	19-Aug-2017	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**11-Jul-2017**	21-Jul-2017	✓	**11-Jul-2017**	21-Jul-2017	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**11-Jul-2017**	21-Jul-2017	✓	**11-Jul-2017**	21-Jul-2017	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132)							
MW61, SW501, SW502, SW506	**07-Jul-2017**	**10-Jul-2017**	14-Jul-2017	✓	**12-Jul-2017**	19-Aug-2017	✓

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
Dissolved Mercury by FIMS	EG035F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	31	**12.90**	**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	3	21	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**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 - Semivolatile Fraction	EP071	1	4	**25.00**	**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	1	20	**5.00**	**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
Dissolved Mercury by FIMS	EG035F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	31	**6.45**	**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	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**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
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**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
Dissolved Mercury by FIMS	EG035F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	31	**6.45**	**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	21	**9.52**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**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
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	31	**6.45**	**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*	
Matrix Spikes (MS) - Continued							
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	4	**25.00**	**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
TRH - Semivolatile Fraction	EP071	1	4	**25.00**	**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
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.
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 - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

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)
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	WATER	In house: Referenced to USEPA 3640 (GPC Cleanup), 8270D GCMS Capiliary column, SIM mode. This method is compliant with NEPM (2013) Schedule B(3)

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 60mL 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.
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	WATER	In house: Referenced to USEPA 3510 (Extraction) / In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace 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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

NEWCASTLE: 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
NOWRA: 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
PERTH: 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY: 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE: 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
WOLLONGONG: 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT:	GHD
OFFICE:	Newcastle.
PROJECT: 2218003	PROJECT NO.:
ORDER NUMBER:	PURCHASE ORDER NO.:
PROJECT MANAGER: IAN GREGSON	CONTACT PH: 4979 9999
SAMPLER: KASEY WILLIAMS	SAMPLER MOBILE: 0402179170
COC Emailed to ALS? (YES / NO)	EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed):	ian.gregson@ghd.com
Email Invoice to (will default to PM if no other addresses are listed):	"

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

☑ Standard TAT (List due date):

☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC: (1) 2 3 4 5 6 7

OF: (1) 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes (No)

Free ice / frozen ice bricks present upon receipt? (Yes) No

Random Sample Temperature on Receipt: 12.6 °C

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Kasey Williams	[signature]	[signature]	P Tm
DATE/TIME: 7/7/17 2pm	DATE/TIME: 7/7/17 14:00	DATE/TIME: 7/7/17 17:00	DATE/TIME: 7/7/17 7:30 pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH/BTEX	PAH Ultra Trace	W-3	Major Ions	Fluoride					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW61	7/7/17	W		5	X	X	X	X	X					
2	SW501	7/7/17	W		5	X	X	X	X	X					
3	SW502	7/7/17	W		5	X	X	X	X	X					
4	SW506	7/7/17	W		5	X	X	X	X	X					
				TOTAL											

E-MAILED

Environmental Division
Sydney
Work Order Reference
ES1716747

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1716747**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR IAN GREGSON	Contact	: Customer Services ES
Address	: PO BOX 5403 NEWCASTLE WEST NSW, AUSTRALIA 2302	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ian.gregson@ghd.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 4979 9908	Telephone	: +61-2-8784 8555
Facsimile	: +61 7979 9988	Facsimile	: +61-2-8784 8500
Project	: 2218003	Page	: 1 of 2
Order number	: ----	Quote number	: ES2015GHDSER0820 (EN/005/16)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: KASEY WILLIAMS		

Dates

Date Samples Received	: 07-Jul-2017 14:03	Issue Date	: 07-Jul-2017
Client Requested Due Date	: 13-Jul-2017	Scheduled Reporting Date	: **13-Jul-2017**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 12.6 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 4

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 (14 days), Solid (60 days) from date of completion of work order.

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 - EP132(PAH) Ultra Trace Polynuclear Aromatic Compounds	WATER - NT-01 & 02A Ca, Mg, Na, K, Cl, SO4, Alkalinity & Fluoride	WATER - W-03 15 Metals (NEPM Suite)	WATER - W-04 TRH/BTEXN
ES1716747-001	07-Jul-2017 00:00	MW61	✓	✓	✓	✓
ES1716747-002	07-Jul-2017 00:00	SW501	✓	✓	✓	✓
ES1716747-003	07-Jul-2017 00:00	SW502	✓	✓	✓	✓
ES1716747-004	07-Jul-2017 00:00	SW506	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

IAN GREGSON

- *AU Certificate of Analysis - NATA (COA)	Email	ian.gregson@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ian.gregson@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ian.gregson@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ian.gregson@ghd.com
- Chain of Custody (CoC) (COC)	Email	ian.gregson@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	ian.gregson@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	ian.gregson@ghd.com
- EDI Format - GHDNEW (GHDNEW)	Email	ian.gregson@ghd.com
- EDI Format - XTab (XTAB)	Email	ian.gregson@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	ian.gregson@ghd.com

GHD

Level 3 GHD Tower 24 Honeysuckle Drive Newcastle NSW 2300
PO Box 5403 Hunter Region Mail Centre NSW 2310
T: (02) 4979 9999 F: (02) 4979 9988 E: ntlmail@ghd.com

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	B. Ashlee	J Simkus		I Gregson		05/03/2018

GHD

Level 3 GHD Tower 24 Honeysuckle Drive Newcastle NSW 2300
PO Box 5403 Hunter Region Mail Centre NSW 2310
T: (02) 4979 9999 F: (02) 4979 9988 E: ntlmail@ghd.com

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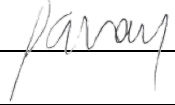
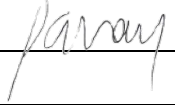
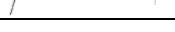
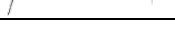
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	L Hammersley	S Gray		S Gray		06/03/2018
1	L Hammersley	S Gray		S Gray		08/05/2018
						

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