CONTAMINATION AND WASTE CLASSIFICATION REPORT
JOHN HUNTER HEALTH AND INNOVATION PRECINCT

Prepared for HEALTH INFRASTRUCTURE

Prepared by RCA Australia

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EXECUTIVE SUMMARY

This report has presented the findings of an environmental site investigation undertaken at the John Hunter Health and Innovation Precinct.

The objective of the report is to provide an understanding of the potential for contamination to be present at the site and it is understood that the report will be used to support the development of a multi storey building on the preferred Development site and proposed internal road networks.

The scope of works undertaken for this assessment was based on the findings of a preliminary site (contamination) assessment (Ref [1]) which indicated a limited potential for contamination to be present at site from historical filling activities inappropriate waste disposal and use of asbestos containing materials. This assessment was undertaken in conjunction with a geotechnical assessment (Ref [2]) and included:

- Intrusive assessment (drilling, test pitting and hand augering) across the entirety of the site to the depth of the underlying bedrock material. The contamination investigation mainly focused on the subsurface soil conditions observed within 2mbgs.
- Collection and analysis of surface and subsurface soil samples from thirty four (34) locations within the site.
- Collection from two (2) locations and analysis of three (3) samples from material understood as having been sourced from a previous roadworks project (the re-surfacing of the internal road between Lookout Road and the bus turning bay) to be used within an area designated for the proposed internal road networks. Following the completion of the works RCA has been advised that the sampled material was not sourced as understood: the source of the material is unknown.

- Personnel from the Local Health District have since identified the location of two (2) stockpiles (refer **Drawing 1**, **Appendix A**) of material generated from the previous roadworks project. These stockpiles require assessment to determine suitability for use on site: the assessment will be provided under a separate cover.

No indications of contamination or anthropogenic waste (including asbestos containing materials) were identified during the fieldworks. RCA analysed forty eight (48) samples for hydrocarbons and metals across the site to characterise the potential for contamination.

No contamination was identified in excess of human health or ecological criteria (Ref [9]) with the exception of benzo(a)pyrene concentrations in one (1) sample in excess of the ecological investigation level for commercial land use. In the absence of sensitive ecological receptors at the site, based on the proposed development comprising building or paving, RCA considers that it is unlikely to pose a risk to the environment for the proposed site use.

RCA considers that the site is suitable for the proposed use. Soil excavated as part of the construction process, subject to the absence of anthropogenic materials (which is considered to be potentially present within the fill embankments) as well as geotechnical and aesthetic requirements, is suitable for use as fill at the site.

All samples were classified as general solid waste in accordance with the relevant guidelines for disposal at a licenced waste facility. Natural materials encountered onsite are considered to be able to be classified as VENM based on the fieldwork observations and sample results.

RCA recommends industry best practice management measures be undertaken during construction with the implementation of best practice dust, soil and water management measures and an unexpected finds protocol which allows for separation and assessment of anthropogenic waste or odorous material in the event that is identified.

Contents

1 INTRODUCTION 1
2 SITE IDENTIFICATION AND DESCRIPTION 1
3 SITE HISTORY AND BACKGROUND INFORMATION 2
4 SAMPLING AND ANALYTICAL QUALITY PLAN 5
5 FIELDWORK 7
6 QUALITY ASSURANCE/QUALITY CONTROL 9
7 RESULTS 9
8 SITE CONTAMINATION CHARACTERISATION 10
9 CONCLUSIONS 11
10 LIMITATIONS 12
REFERENCES 13
GLOSSARY 14

APPENDIX A

DRAWINGS

APPENDIX B

SCREENING LEVELS AND GUIDELINES

APPENDIX C

QUALITY ASSURANCE REVIEW AND LABORATORY REPORT SHEETS

APPENDIX D

BORE, HAND AUGER & TEST PIT LOGS

APPENDIX E

PHOTOGRAPHS

APPENDIX F

SUMMARY OF RESULTS

1 INTRODUCTION

This report details the findings of a site contamination assessment and waste classification undertaken at the John Hunter Health and Innovation Precinct project area.

It is understood the project comprises a multi storey building (with lift pits) and approximately 2km of access roads. The Development site is to the north of the existing John Hunter Hospital and will connect to the existing hospital via a concourse and link ways.

The purpose of the investigation is to provide an understanding of the potential contamination to be present within Development zone and within the new road networks (herein referred to as the 'site'). This is based on the preliminary site assessment completed by RCA (Ref [1]) and analysis of surface and subsurface soil samples taken from site.

RCA are also providing a Geotechnical Investigation Report (Ref [2]) as part of the investigation phase for the area preferred for construction of the multi-storey building and associated new road networks. This report contains detailed geotechnical descriptions of the surface and subsurface conditions at the site together with recommendations for site preparation, earthworks and foundation design.

RCA are also providing an update (Ref [3]) of the asbestos register for buildings within the John Hunter hospital site: the extent of works may not relate to the proposed development site depending on the final design of the project.

The investigation was undertaken at the request of Health Infrastructure under Contract HI19320.

2 SITE IDENTIFICATION AND DESCRIPTION

The site is located adjacent to the John Hunter hospital and described as part Lot 2 DP1228246. Additional site details are shown in **Table 1**.

Table 1 *Site Details*

Current zoning (Ref [4])	SP2 Infrastructure: Health Services Facility
Current use	Vacant Bushland with access tracks.
Proposed use	Multi storey clinical service building
Size of site	~1ha
Land use to the: North	Hunter Medical Research Institute (HMRI) building, carpark and bushland (proposed Development site (research and education precinct))
South	John Hunter Hospital
East	Bushland and medical buildings.
West	John Hunter hospital buildings, carparking and bushland
Nearest sensitive receptor (human health)	Residential dwellings approximately 500m to the east.
Nearest sensitive receptor (environmental)	Unnamed tributary of Flats Creek approximately 180m to east and north. It is noted that stormwater from part of the hospital site appears to be directed to the tributary.

Drawing 1, **Appendix A** shows the locality, location of the Development site and the layout of the proposed road network area.

3 SITE HISTORY AND BACKGROUND INFORMATION

A detailed site history review was conducted by RCA within the preliminary site (contamination) report provided to Health Infrastructure (Ref [1]). The assessment involved the review of multiple government registers, historical photographs, maps, previous investigations and general site conditions and observations. A summary of the assessment is detailed below:

- Search of the Office of Environment and Heritage (OEH) register http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx) for the suburb of New Lambton.
    - This identified a total of seventeen (17) heritage items, four (4) of these related to the grounds of John Hunter hospital.
- Search of the Historical Land Records Viewer (https://hlrv.nswlrs.com.au/).
    - No records relevant to the suburb of New Lambton were found.
- Review of the Newcastle Library (http://www.newcastle.nsw.gov.au/Library/Heritage-History/Search-the-Collection/Hunter-PhotoBank) and Newcastle Herald archival records (http://www.theherald.com.au/story/1723759/archival-revival-newcastle-in-the-1800s-photos/#slide=1).
    - Photographs were discovered showing the construction of John Hunter hospital labelled as circa 1986, the construction of Rankin Park hospital in 1936 and 1950 and two (2) aerial images identified as being of New Lambton in 1965.
    - Records from the State Library of NSW (http://archival.sl.nsw.gov.au/home were also reviewed, however none were identified as having relevance to the site.

- Review of historical aerial photographs of the John Hunter site from 1954 till 2018.
  - This review identified that the site was bushland until the development of the John Hunter hospital in the late 1980s. It also identified that construction of the HMRI facility to the north of the site was completed by 2012.
- Search of the NSW EPA public register of environmental protection licences (http://www.epa.nsw.gov.au/publicregister/) for the suburb of New Lambton Heights.
  - This search identified a total of four (4) records relevant to the site. The review concluded that based on the absence of monitoring requirements the documents are not relevant to the potential for contamination at the site except to understand that wastes which required licensing were generated at the medical facilities situated on site.
- Search of the sites notified to the NSW EPA as potentially requiring regulation (http://www.epa.nsw.gov.au/clm/publiclist.htm as updated 1 August 2019).
  - This confirmed that the site is not notified, nor is any site within New Lambton Heights, Rankin Park or Elermore Vale. The search also reviewed the suburbs of North Lambton and New Lambton and identified four (4) sites, however concluded that the sites are all service stations and are a significant distance from the site and therefore are unlikely to impact the site.
- Search of the NSW EPA gasworks database (http://www.epa.nsw.gov.au/clm/gasworkslocation.htm).
  - This search confirmed that there are five (5) known gasworks within City of Newcastle council area. None of these locations are within close proximity to the site and therefore were deemed too distant to have a potential impact on the site.
- Search of the NSW Office of Fair Trading asbestos insulation register (http://www.fairtrading.nsw.gov.au/ftw/Tenants_and_home_owners/Loose_fill_asbestos_insulation/Public_Search/LFAI_Public_Register.page).
  - This determined the absence of known loose-fill asbestos insulation at buildings registered at 2 Lookout Road.
- Review of previous investigations conducted at the site.
  - This review concluded that there had been no dedicated contamination assessment reports undertaken at the site prior to the current works being completed by RCA. The review also stated that six (6) geotechnical reports have been undertaken at the site previously and the majority of the reports had no consideration for potential sources of contamination.
  - An assessment on the grounds of John Hunter hospital (Ref [5]) and the proposed Newcastle Inner City Bypass alignment (Ref [6]) for potential sources of contamination was conducted in 2002 and 2016, respectively. No samples from either of these investigations were taken within the proposed Development site and as such were not considered directly relevant in the review.
- Review of published geological and hydrogeological maps.
  - The site was found to be within the Killingworth soil landscape which comprises brownish black pedal loam (topsoil) over bleached hardsetting loamy sand to sandy clay loam over pedal yellow brown clay.

  - The acid sulfate soil risk map for Wallsend found the site is within an area of no known occurrence of acid sulfate soils.
  - The review found no registered groundwater bores or known uses for groundwater at the site. The estimated flow direction was deemed unknown, however likely to be influenced by the presence of coal seams. The only background information within the area was derived from the Newcastle Inner City Bypass alignment report (Ref [6]) which found low concentrations of hydrocarbons and metals.
- Review of general site conditions and observations encountered during site inspection.
  - Variable slope generally to the north and west.
  - No visual signs of contamination, storage of chemicals or asbestos bearing materials.
  - Localised odours of sewage near sewer access points.
  - Concrete material discovered at surface of embankment, however considered to be indicative of construction works.
  - Minimal signs of localised rill erosion and plant stress (with the exception of purposely built clear sight lines).
  - Housing of exhaust pipes from nearby diesel generators.

The review assessed current information and historical documentation generally relating to the site, as far back as the 1950s. In relation to potential contamination, the review concluded that there are no details regarding specific use that may have been undertaken at the site and there is no contamination information specific to the Development site although there has been analysis of soil and groundwater samples in the nearby areas.

The preliminary report (Ref [1]) identified the potential for historical filling at the site, due to the construction of the main hospital building and the more recent HMRI building and carpark. The report also identified the site as being licensed by the NSW EPA to store of hazardous waste materials, and therefore considered there was a potential for inappropriate disposal of the materials at the site. Dumping of asbestos containing building materials was also identified as a potential source of contamination at the site due the information noting that some buildings nearby the site were identified to contain asbestos.

A ‘stockpile’ of material was also identified to the north of the HMRI carpark. The report summarised that the material was potentially contaminated with hydrocarbons and metals as it was understood at the time of fieldwork to have been excavated from the main access road into the John Hunter site. RCA have since been advised that this is not correct and the source of the material is unknown.

4 SAMPLING AND ANALYTICAL QUALITY PLAN

No formal sampling and analytical quality plan (SAQP) was developed for the project, however RCA prepared a Geotechnical and Contamination Investigation Plan (GCIP, Ref [7]). The GCIP (Ref [7]) outlined RCA's approach to the investigation through summary of the methodology and the generalised works sequence based on the Scope of Services outlined in the request for tender (RFT) document and as informed by the preliminary contamination report (Ref [1]) and preliminary geotechnical report (Ref [8]).

Table 2 provides detail and rationale regarding the scope of works for the contamination investigation undertaken at the site.

Table 2 *Data Quality Objectives of the Site Investigation*

Data Quality Objective	Description
Step 1- State the Problem	Development for the John Hunter Health Innovation Precinct is proposed to the north of the existing John Hunter hospital building. An assessment of the potential for contamination (Ref [1]) indicates that there is limited potential for contamination at the site, restricted to historical filling activities, inappropriate waste disposal and use of asbestos containing materials, however characterisation of the site's contamination status is required prior to the commencement of development at the site to ensure it is suitable for the proposed development for commercial use.
Step 2- Identify the Goal and Decisions	To adequately characterise the potential contamination at the site and identify whether there are any constraints to the proposed development.
Step 3- Identify the Inputs to the decisions	Site history information and previous assessments. Intrusive assessment via drill rig, hand auger and test pit to include visual assessment of the strata encountered and associated logging and observations. Installation of groundwater monitoring bores, if groundwater is encountered. Collection of soil samples and groundwater samples if encountered. Laboratory analysis of collected samples. Guidelines for assessing risk to human health and the environment from contaminated soil and/or groundwater. Full details of the relevant guidelines are included in **Appendix B**.
Step 4- Define the Boundaries of the investigation	The horizontal extent of the hand auger and borehole assessment has been defined by the Development boundary. The test pitting will be conducted along the proposed internal roadworks area. Samples will also be collected within the discussed 'stockpile' material The extent of the Development site and the proposed road network is shown on **Drawing 1 & 2**, **Appendix A**. The vertical extent of contamination sampling was determined by consideration of the conceptual site model (Ref [1]) and was to be defined by the expected depth of the interface between fill and natural material for soil. It is noted that groundwater was to be assessed by the concurrent geotechnical investigation (Ref [2]) if encountered. Practical constraints that could have interfered with sampling comprised underground services. Working within the timeframe outlined in the RFT, with adjustment for the starting date. No specific financial constrains were identified, noting that any variations to costs identified to client were to be confirmed with client prior to additional cost being incurred.
Step 5- Develop	Data Quality Indicators of accuracy, precision, completeness, representativeness

Data Quality Objective	Description
the Decision Rules	and comparability were to be used for the project. Specific criteria are detailed in the Quality Assurance and Control Assessment for the project, **Appendix C**.
Step 6- Acceptable Limits on Decision Rules	In the event that data was received which was not in accordance with the DQI, the useability of data was to be determined after consideration of: • Closeness of the result to the guideline concentrations. • Specific contaminant of concern (e.g., response to carcinogens may have been more conservative, ease through exposure pathway or potential to bio accumulate). • The area of sample location(s) in question: including the potential lateral and vertical extent of questionable information. • Whether the uncertainty can be effectively managed by site management controls. The significance of the non-conformance would have determined if rectification was required. Refer to the Quality Assurance and Control Assessment for the project, **Appendix C**.

The scope of work, Section 5, is considered to comprise Step 7 of the DQO.

5 FIELDWORK

The collection of samples for contamination purpose was undertaken by geotechnical engineers during the drilling and test pitting for geotechnical works (as reported in Ref [2]) between the 24 September and 15 October 2019.

The scope of work included:

- Location of services
- The collection of twenty three (23) soil samples from nine (9) borehole locations within the Development site:
    - Samples were collected from fill and natural materials from between depths of approximately 0.1 and 3 metres below the existing ground surface (mbgs).
    - Analysis of one (1) surface soil sample from each location plus an additional five (5) subsurface samples at BH102, BH103, BH105 and BH109.
- The collection of nine (9) soil samples from nine (9) test pit locations within the area of the proposed new road networks:
    - Test pits were excavated adjacent the existing road surfaces rather than through the road surface (where present) as intended due to logistical constraints (potential traffic and services).
    - Samples were collected from natural materials at approximately 0.1mbgs at all test pit locations.
    - Five (5) additional samples were collected from road pavement material at TP101, TP102, TP103, TP108 and TP109.
    - Analysis of one (1) surface soil sample from each test pit location, along with the five (5) additional road pavement samples.
- Logging of test pits and boreholes including description of samples for texture, colour, odour, moisture content. Logs are attached in **Appendix D**.
- All selected soil samples were laboratory analysed for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH) and metals (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury).
    - Additional leachability analysis for PAH was conducted on the surface sample collected from BH108 following the results of the additional analysis.
- Re-instatement of test pit and borehole excavations.

An environmental engineer experienced in the handling of potentially contaminated soil undertook fieldwork on 2 October 2019.

The scope of work included:

- Location of services

  - Services were previously located with RCA's geotechnical team. All environmental hand auger locations were assessed with the geotechnical engineer prior to making any insertions into the ground.
  - Services (water and power utilities) were encountered onsite which impacted the preferred location of HA1, HA2 and HA3. The new locations are considered to allow for characterisation of the north eastern portion of the site.
- The collection of twenty two (22) soil samples from eleven (11) hand auger locations within the Development site:
  - Samples were collected from fill and natural materials from between depths of approximately 0.1 and 1.6mbgs.
  - Analysis of one (1) surface soil sample from each location and an additional five (5) subsurface samples from HA3, HA5, HA8, HA10 and HA11.
- Five (5) additional samples were collected from the 'stockpile' material discussed in the preliminary report (Ref [1]) noting that the understood source of the material has since been shown to be incorrect. The samples were collected from between depths of approximately 0.1 and 0.9 metres below the surface of the 'stockpile'.
  - Three (3) samples from the 'stockpile' material and one (1) from the underlying natural material were analysed.
- Logging of hand auger locations including description of samples for texture, colour, odour, moisture content. Logs are attached in **Appendix D**.
- Re-instatement of hand auger excavations.
- All selected soil samples were laboratory analysed for TRH, BTEXN, PAH and metals.

Sampling locations taken within Development site are shown on **Drawing 2**, **Appendix A** as are the location of photographs taken during the works. Test pit sampling locations are shown on **Drawing 1**, **Appendix A**. All photographs are attached in **Appendix E.**

No visual or olfactory contamination issues were observed during fieldwork.

No indications of anthropogenic waste, including asbestos containing materials, were observed during fieldwork.

Assessment of Development site was undertaken to a maximum depth of 3.2mbgs (BH109), however was generally around 1.0-2.0mbgs due to refusal against rock, as shown in the geotechnical bore logs (**Appendix D)**. Surface and subsurface conditions during augering works indicated fill material was present in eleven (11) of the twenty (20) locations to a maximum depth of 2.4mbgs (BH109). Test pitting within the proposed internal road network area was undertaken to a maximum depth of 2.2mbgs (TP102), however was generally around 0.5-1.5mbgs due to refusal against rock (**Appendix D)**. The environmental samples were generally collected from the surface material at each test pit location, with five (5) additional samples being collected from the road pavement material in these areas.

Groundwater was not encountered during the test pitting or augering works. Works undertaken for the geotechnical assessment (Ref [2]) have identified groundwater to be present at depths varying between 11.60 and 15.90mbgs. These depths are within the cored bedrock and are potentially considered to relate to water storage from drilling works and infiltration migrating vertically and becoming perched above the bedrock as opposed to a groundwater aquifer.

6 QUALITY ASSURANCE/QUALITY CONTROL

RCA has assessed the quality assurance and control in **Appendix C** and found it to be acceptable for the purpose of site assessment.

7 RESULTS

All soil results are compared to the relevant criteria (Ref [9]) in **Appendix F** as summarised below.

- BTEXN concentrations were not detected above the laboratory's detection limit in any of the samples analysed and are therefore considered to be below the relevant criteria (Ref [9]).
- TRH >C_{16}-C_{34} and TRH >C_{34}-C_{40} concentrations were not detected above the laboratory's detection limit in the majority of samples. Concentrations were measured in fourteen (14) of the forty eight (48) samples: these were below the relevant human health and ecological protection criteria (Ref [9]).
- Concentrations of PAH were not detected above the laboratory's detection limit or were detected at low concentrations below the relevant criteria (Ref [9]) with the exception of:
    - BH108A (0.1m) which reported concentrations of benzo(a) pyrene above the ecological criterion (Ref [9]). Refer to **Section 8** for discussion.
- Concentrations of metals were either not detected above the laboratory's detection limit or were detected at low concentrations below the relevant criteria (Ref [9]) for commercial site use.

The results were also compared to Tier 1 criteria of the relevant waste guidelines (Ref [10]) and are presented in **Appendix F.**

- All the samples were classified as general solid waste with the exception of:
    - BH108A (0.1m) which reported low concentrations of benzo(a) pyrene above the relevant criterion (Ref [10])

      It is noted that a duplicate of RP103 (QA5) exhibited concentrations of benzo(a) pyrene above the relevant criterion (Ref [10]).

      Refer to **Section 8** for discussion.

Additional analysis was undertaken on BH108A to allow assessment against Tier 2 criteria (Ref [10]) and **Table 3** below summarises the reported results for benzo(a) pyrene.

Table 3 *Total and leachable concentrations of benzo(a) pyrene – BH108A (0.1m)*

	Tier 2 General Solid Waste Criteria (Ref [10])	Benzo(a) pyrene
Leachable Concentrations	0.04	<0.001
Total Concentration	10	2.9

As such the sample from BH108A is classified as general solid waste in accordance with the guidelines (Ref [10]).

It is noted that further analysis of sample QA5 was not completed as the sample was taken in similar material composition to BH108A and the results of BH108A were considered to provide understanding of potential leaching properties. It is also noted that sample RP103 was below the relevant waste guidelines (Ref [10]).

8 SITE CONTAMINATION CHARACTERISATION

Sampling of soils from twenty (20) locations across the Development site and eighteen (18) locations along the proposed internal roads was undertaken to characterise and assess the extent of potential contamination impact, if any. The number of locations with the footprint of the Development site is just below the minimum twenty (21) locations recommended (Ref [11]) for a site of approximately 1ha in size as, at the time of sampling, BH110 had been withdrawn from the geotechnical sampling programme. While this bore was subsequently drilled RCA did not collect environmental samples based on the homogeneity of the works already completed, the proximity of BH102 and BH111b and the absence of indications of contamination at the site. It is not considered that the absence of an investigation location represents uncertainty in the characterisation of the site. It is noted that the sampling frequency meets the requested (in the tender documentation) density of 1/500m^2.

Nine (9) test pit locations and five (5) locations within road pavement material were taken along the proposed internal roadwork area. This represents a sample approximately every 250m and is considered to provide sufficient information to characterise the potential contamination in the fill and natural materials along the proposed road alignment.

Four (4) samples were collected from the 'stockpile' material located to the north of the HMRI carpark. This is considered to be in accordance with the recommended (Ref [9]) sampling density of 1/25m^3 and is sufficient to characterise the material's potential contamination.

Identified contamination was limited to concentrations of benzo(a)pyrene in excess of the ecological criterion (Ref [9]) within the fill at BH108. This location was situated immediately adjacent a road (refer **Photograph 2, Appendix E**) and the inclusion of fragments of asphalt in the sample is considered to be the source of the PAH contamination. No other concentrations of PAH were detected at the site and as such RCA considers that the contamination is localised to this area and potentially the access road materials (including asphalt). The proposed development comprises a building over the majority of the site and as such the benzo(a)pyrene concentration at BH108 is not considered to pose a constraint to the development.

No contamination was identified within the material situated north of the HMRI carpark, noting that duplicate analysis has indicated some variability in the benzo(a)pyrene concentrations. It is considered that this material can be used, subject to geotechnical and aesthetic requirements, as fill at the site.

All samples analysed have been classified as general solid waste, noting that there was one concentration of benzo(a)pyrene which required testing in accordance with Tier 2 of the guidelines (Ref [10]) to achieve that classification. RCA notes that, based on the testing and the extent of investigation undertaken, the natural materials at site can be considered virgin excavated natural material (VENM). It is recommended that the earthworks balance be assessed prior to commencement of construction and if material requires removal from site, subject to geotechnical requirements, that VENM be preferentially removed from site to maximise resource recovery.

RCA does not consider that assessment of groundwater is required for the purpose of consideration of contamination however notes that assessment may be required if groundwater is to be extracted as part of construction or for use at the site.

RCA considers the site is suitable for construction and future commercial use and that any soil excavated as part of the construction, subject to the absence of anthropogenic materials (which is considered to be potentially present within the fill embankments) as well as geotechnical and aesthetic requirements, is suitable to be used at the site as fill. Based on the findings of this investigation, notification and subsequent regulation of the site under the Contaminated Land Management Act is not required.

RCA recommends construction be undertaken with the implementation of best practice dust, soil and water management measures and an unexpected finds protocol which allows for separation and assessment of anthropogenic waste or odorous material in the event that is identified. All material being removed from the site must be classified in accordance with NSW waste legislation: any stockpiles of VENM should be strictly managed to avoid contamination by building waste or other materials.

It is noted that two (2) stockpiles have been identified with the John Hunter site (refer **Drawing 1, Appendix A**) and require characterisation to assess suitability for use as part of the development, specifically as part of road construction. One stockpile, for which preliminary estimates are for greater than 2000m^3 is that sourced from the re-surfacing of the internal road between Lookout Road and the bus turn around bay. The source of a second stockpile, estimated to be approximately 330m^3, is unknown. This classification will be presented under a separate cover.

9 CONCLUSIONS

This report has presented the findings of a site contamination assessment and waste classification undertaken at the Development site for the John Hunter Health and Innovation Precinct and proposed internal road network.

The assessment followed on from a preliminary assessment (Ref [1]), which indicated a limited potential for contamination to be present at site from historical filling activities inappropriate waste disposal and use of asbestos containing materials. This assessment was undertaken in conjunction with a geotechnical assessment (Ref [2]) at the site.

The scope comprised intrusive assessment (drilling, test pitting and hand augering) across the entirety of the site to the depth of the underlying bedrock material. The contamination investigation mainly focused on the subsurface soil conditions observed within 2mbgs.

No indications of contamination or anthropogenic waste (including asbestos containing materials) were identified during the fieldworks. RCA analysed forty eight (48) samples for hydrocarbons and metals across the site to characterise the potential for contamination.

No contamination was identified in excess of human health or ecological criteria (Ref [9]) with the exception of benzo(a)pyrene concentrations in one (1) sample in excess of the ecological investigation level for commercial land use (Ref [9]). In the absence of sensitive ecological receptors at the site RCA considers that it is unlikely to pose a risk to the environment for the proposed use.

RCA considers that the site is suitable for the proposed use. Soil excavated as part of the construction process, subject to the absence of anthropogenic materials (which is considered to be potentially present within the fill embankments) as well as geotechnical and aesthetic requirements, is suitable for use as fill at the site.

All samples were classified as general solid waste in accordance with the guidelines (Ref [10]) for disposal at a licenced waste facility. Natural materials encountered onsite are considered to be able to be classified as VENM (Ref [10]) based on the fieldwork observations and sample results

RCA recommends industry best practice management measures be undertaken during construction with the implementation of best practice dust, soil and water management measures and an unexpected finds protocol which allows for separation and assessment of anthropogenic waste or odorous material in the event that is identified.

In addition to the findings of this report, two (2) stockpiles near the north western car park (refer **Drawing 1**, **Appendix A**) contain material from the previous road resurfacing project. These stockpiles will require additional assessment to determine suitability for reuse of the material on the site; this assessment will be provided under separate cover.

10 LIMITATIONS

This report has been prepared for Health Infrastructure in accordance with an agreement with RCA Australia (RCA). The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Health Infrastructure. The report may not contain sufficient information for purposes of other uses or for parties other than Health Infrastructure. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA Australia.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA

Zac Laughlan
Environmental Engineer

Fiona Brooker
Environmental Services Manger

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[1] RCA Australia, *Preliminary Site (Contamination) Assessment, John Hunter Health And Innovation Precinct*, RCA ref:14399-203/1, November 2019.

[2] RCA Australia, *Geotechnical Investigation Report, John Hunter Health And Innovation Precinct*, RCA ref:14399-207/1, December 2019.

[3] RCA Australia, *Update of Asbestos Register, John Hunter Health And Innovation Precinct*, RCA ref:14399-209/0, November 2019

[4] Newcastle Local Environment Plan 2012 under the Environmental Planning and Assessment Act 1979, current version 12 July 2019.

[5] Coffey Geosciences Pty Ltd, *Geotechnical Assessment, Newcastle Strategy – John Hunter Hospital (Access) Redevelopment*, 2002.

[6] Aurecon, *Newcastle Inner City Bypass – Rankin Park to Jesmond Concept Design and Environmental Assessment, Geotechnical Interpretive Report,* Ref 245321, revision 04, July 2016

[7] RCA Australia, *Geotechnical and Contamination Investigation Plan, John Hunter Health And Innovation Precinct*,RCA ref:14399-204/0, September 2019.

[8] RCA Australia, *Desktop Geotechnical Geotechnical Assessment, John Hunter Health And Innovation Precinct*, RCA ref:14399-201/0, September 2019.

[9] NEPC, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 as amended 2013.

[10] NSW EPA, *Waste Classification Guidelines*, *Part 1; Classifying Waste*, November 2014.

[11] NSW EPA, *Sampling Design Guidelines*, September 1995.

[12] CRC Care, *Technical Report 10, Health screening levels for petroleum in soil and groundwater*, September 2011.

[13] Standards Australia, *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*, AS 4482.1-2005.

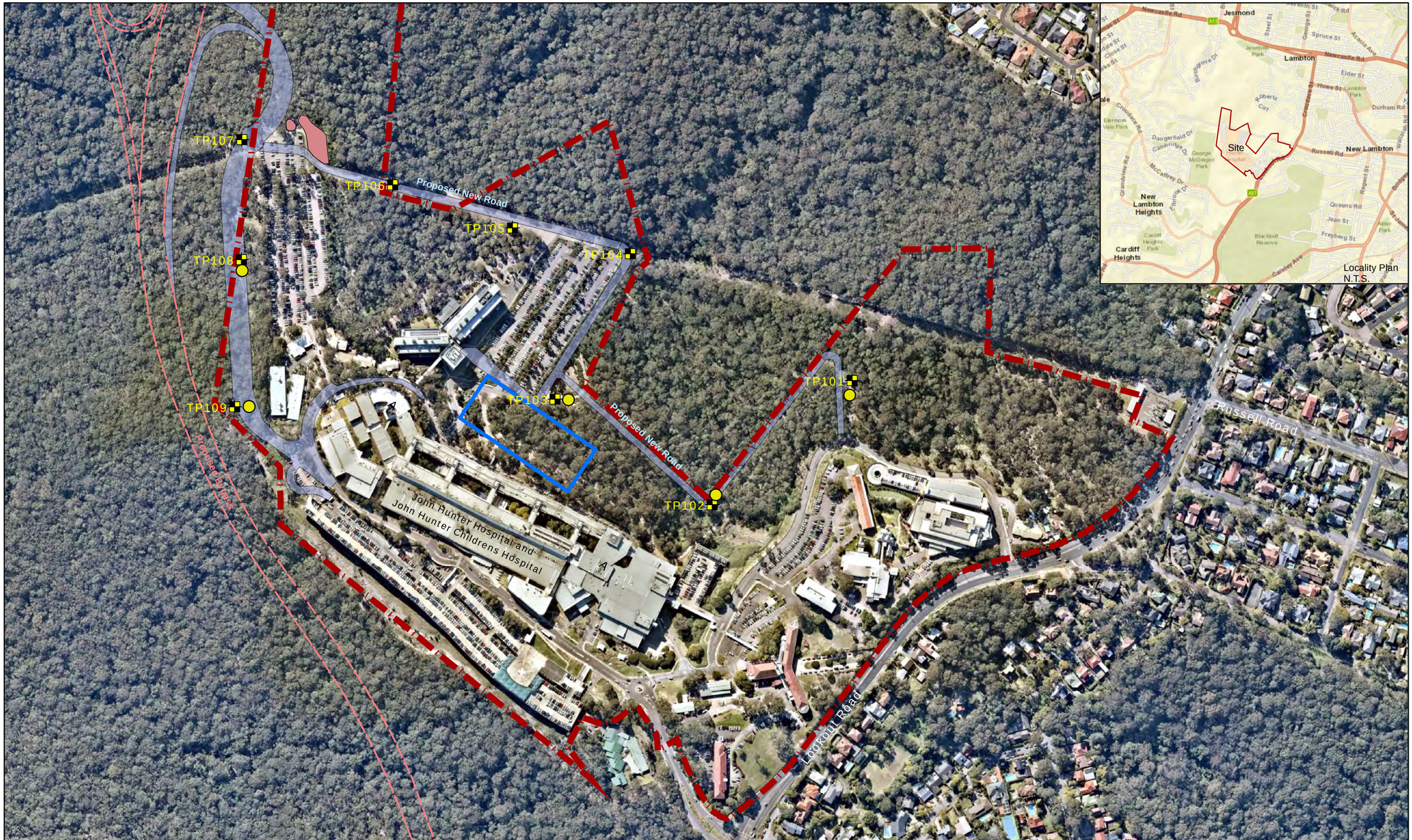
GLOSSARY

95%UCL_{ave}	A statistical calculation – 95% Upper Confidence Limit of the arithmetic mean of the data set.
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure.
EIL	Ecological investigation level. Relates to soil concentrations which may pose a risk to ecological health.
ESL	Ecological screening level. Relates to vapour risk from petroleum hydrocarbons which may pose a risk to ecological health.
HIL	Health investigation level. Relates to soil concentrations which
HSL	Health screening level. Relates to the vapour risk from petroleum hydrocarbons which may pose a risk to human health in soil.
In-Situ	In place, without excavation.
Interlaboratory	A sample sent to two different laboratories for comparative analysis.
Intralaboratory	A sample split into two and sent blind to the sample laboratory for comparative analysis.
ISL	Investigation screening levels for soil. Comprised of HIL/EIL and HSL/ESL
Leachate	Fluid that has passed through a soil stratum, possibly collects contaminants.
mg	milligram, 1/1000 gram.
NEPC	National Environment Protection Council.
NSW EPA	NSW Environment Protection Authority – formerly a component of DECC, DECCW, OEH but made a separate entity in 2011 to regulates the contaminated land industry.
OEH	NSW Office of Environment and Heritage.
QA	Quality Assurance.
QC	Quality Control.
RPD	Relative Percentage Difference.
TCLP	Toxicity characteristic leaching procedure. An analysis designed to mimic the transfer of contaminants from soil into water. Undertaken in acidic environment and used to determine impact in landfill conditions.
VENM	Virgin Excavated Natural Material

Weathering	All physical and chemical changes produced by atmospheric agents.
<u>Chemical Compounds</u>	
BTEX	Benzene, toluene, ethylbenzene, xylene.
PAH	Polycyclic aromatic hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.
TPH	Total petroleum hydrocarbons.
TRH	Total recoverable hydrocarbons

Appendix A

Drawings



LEGEND

- Approximate site boundary
- Proposed Development site
- Test pit location
- Approximate road pavement sample
- Stockpiles to be assessed
- Proposed roads
- Proposed bypass alignment

Aerial image taken from Nearmap, August 15 2019
(used in accordance with commercial licence)

0 25 50 100 150 200
metres

N

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

SITE LOCALITY AND TEST PIT LOCATION PLAN
CONTAMINATION AND WASTE
CLASSIFICATION REPORT
JOHN HUNTER HEALTH AND
INNOVATION PRECINCT

CLIENT	Health Infrastructure			RCA Ref	14399-208/3
DRAWN BY	ZL	SCALE	1:4,000 (A3)	DRAWING No 1	REV 2
APPROVED BY	FB	DATE	3/12/2019	OFFICE	NEWCASTLE

LEGEND

- Approximate site boundary
- Proposed development Northern Option - Stage 1
- Borehole location
- Hand auger location
- Test pit location
- Approximate road pavement sample
- Approximate material sample location
- Approximate photograph location and direction
- Proposed roads
- Proposed bypass alignment

Aerial image taken from Nearmap, August 15 2019 (used in accordance with commercial licence)

0 10 20 40 60 80
metres

N

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

LAYOUT AND SAMPLING LOCATION PLAN
CONTAMINATION AND WASTE CLASSIFICATION REPORT
JOHN HUNTER HEALTH AND INNOVATION PRECINCT

CLIENT	Health Infrastructure			RCA Ref	14399-208/3
DRAWN BY	ZL	SCALE	1:1,500 (A3)	DRAWING No 2	REV 2
APPROVED BY	FB	DATE	3/12/2019	OFFICE	NEWCASTLE

Appendix B

Screening Levels and Guidelines

NATIONAL ENVIRONMENT PROTECTION (ASSESSMENT OF SITE CONTAMINATION) MEASURE 1999 AS AMENDED 2013

Soil

The investigation and screening levels (ISL) utilised for the assessment of the soil on site were sourced from the National Environment Protection Measure for the Assessment of Site Contamination (ASC NEPM, Ref [9]). These ISL are not derived as acceptance criteria for contamination at a site, but as levels above which specific consideration of risk, based on the site use and potential exposure, is required. If a risk is determined as present, then remediation and/or management must be undertaken.

Assessment ISL are based on:

- Human Health.

  Intentionally conservative health investigation levels (HIL) have been derived for four (4) generic land use settings.

  - HIL 'A' - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry). This category includes children's day care centres, preschools and primary schools.
  - HIL 'B' - Residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high rise buildings and flats.
  - HIL 'C' - Public open space such as parks, playgrounds, playing fields (e.g. ovals) secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves).
  - HIL 'D' - Commercial/industrial such as shops, offices, factories and industrial sites.

  The exposure scenario for the derivation of the relevant land use setting is set out in the table below.

  Health screening levels (HSL) have been determined for risks associated from vapour intrusion from petroleum[1] compound contamination for the same land use settings. These HSL are additionally based on the fraction of compound, the soil texture and the depth of the encountered soil.

  Direct hydrocarbon contact criteria are not provided in the ASC NEPM (Ref [9]), however these are provided in CRC Care Technical Report 10 (Ref [12]) which is the source document for the HSL.

- Ecological Health

  These levels are considered to apply to soil within two (2) metres of the surface, the root zone and habitation zone of many species.

[1] Laboratory analysis of hydrocarbons is being reported as total recoverable hydrocarbons (TRH). This testing method includes all forms of hydrocarbons, not just petroleum hydrocarbons and therefore can be considered a conservative measure against the chosen TPH criteria. Further laboratory analysis using a silica gel clean up (TRH_{sg}) is considered to enable a better identification of the extent of petroleum based contamination.

Ecological investigation levels (EIL) have been determined for arsenic, copper, chromium III, DDT, naphthalene, nickel, lead and zinc in soil based on species sensitivity model and for three (3) generic land use settings:

- Areas of ecological significance – for areas where the primary intention is for the conservation and protection of the natural environment. Protection level of 99%.
- Urban residential areas and public open space – broadly equivalent to the HIL A, HIL B and HIL C land use settings. Protection level of 80%.
- Commercial and industrial land uses – considered to be broadly equivalent to HIL D land use setting. Protection level of 60%.

Methodology for the derivation of EIL for other contaminants is available in the ASC NEPM (Ref [9]) and requires additional soil character data.

Ecological screening levels (ESL) have been determined for petroleum compound contamination. Due to limitations in the data only moderate reliability ESL have been determined for fractions $<C_{16}$, applied generically in fine and coarse grained soils. ESL for petroleum fractions $> C_{16}$, BTEX and naphthalene are consider low reliability.

- Aesthetics

  Aesthetic considerations operate separately to the HIL/HSL and EIL/ESL assessment. Issues to be considered include:

  - Highly malodorous soils or extracted groundwater (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in soil or extracted groundwater, organosulfur compounds).
  - Hydrocarbon sheen on surface water.
  - Discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature.
  - Large monolithic deposits of otherwise low-risk material, e.g. gypsum as powder or plasterboard, cement kiln dust.
  - Presence of putrescible refuse including material that may generate hazardous levels of methane such as a deep-fill profile of green waste or large quantities of timber waste.
  - Soils containing residue from animal burial (e.g. former abattoir sites).

  Site assessment requires consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity. For example, higher expectations for soil quality would apply to residential properties with gardens compared with industrial settings.

Tier 1 assessment comprises the comparison of the soil data with the HIL/HSL and EIL/ESL. In the event that some concentrations are in excess of the relevant criteria, the summary statistics of the data set may be utilised for assessment purpose. Consideration of a range of statistics is recommended; at a minimum the $95\%UCL_{ave}$ should be compared to the relevant criteria as long as:

- No single value exceeds 250% of the relevant criterion.

- The standard deviation of the results for each analyte is less than 50% of the relevant criterion.

In addition to appropriate consideration and application of the HSL and ESL, there are a number of policy considerations which reflect the nature and properties of petroleum hydrocarbons:

- Formation of observable light non-aqueous phase liquids (LNAPL).
- Fire and explosive hazards.
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services by hydrocarbons.

The ASC NEPM (Ref [9]) has therefore provided management limits, the application of which will require consideration of site-specific factors such as the depth of building basements and services and depth to groundwater, to determine the maximum depth to which the limits should apply. The management limits may have less relevance at operating industrial sites (including mine sites) which have no or limited sensitive receptors in the area of potential impact. When the management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed.

The presence of site hydrocarbon contamination at the levels of the management limits does not imply that there is no need for administrative notification or controls in accordance with jurisdiction requirements.

The following figure has been taken from the ASC NEPM (Ref [9]) to illustrate the assessment methodology in regards to petroleum contamination.

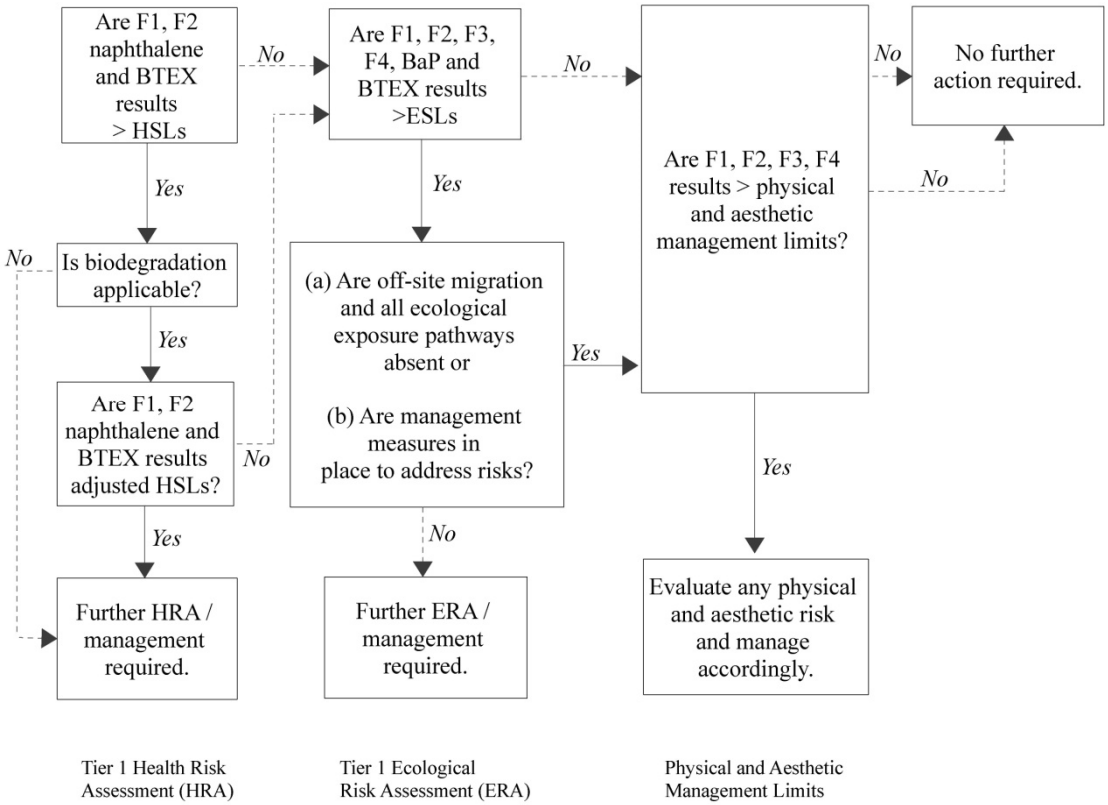


Figure 1 *Flowchart for the Tier 1 human and ecological risk assessment of petroleum hydrocarbon contamination – application of HSL and ESL and consideration of management limits*

Commercial/Industrial Premises

Summary of Exposure Pathways	Abbreviations	Units	Parameters
			Adult
Body weight	BW_A or BW_C	kg	70
Exposure duration	ED_A or ED_C	years	30
Exposure frequency	EF	days	240
Soil/dust ingestion rate[1]	IR_{SA} or IR_{SC}	mg/day	25 [5]
Soil/dust to skin adherence factor	AF	$mg/cm^2/day$	0.5
Skin surface area	SA_A or SA_C	cm^2	20 000
Fraction of skin exposed	F_s	%	19
Dermal absorption factor	DAF	%	Chemical specific values applied
Time spent indoors on site each day	ET_i	hours	8
Time spent outdoors on site each day	ET_o	hours	1
Home-grown fraction of vegetables consumed	F_{HG}	%	0
Vegetable & fruit consumption rate	C_y (veg and fruit)	g/day	-
Averaging time for carcinogens ('lifetime')	AT_{NT}	years	70
Dust lung retention factor	RF	%	37.5

Soil ingestion rates for the HIL D scenario are based on the default soil/dust ingestion rates, corrected for an 8 hr/day daily exposure duration (50% of total waking hours)

NSW EPA 2014, WASTE CLASSIFICATION GUIDELINES

The waste classification guidelines (Ref [10]) are designed to ensure waste streams are managed appropriately and in accordance with the Protection of the Environment Operations Act 1997 (the POEO Act) and its associated regulations. The guidelines classify waste into groups which pose similar risks to the environment and human health; and facilitate their management and appropriate disposal.

Six waste classes are used:

- Special waste:
  - Clinical or related waste, asbestos waste, waste tyres.
- Liquid waste:
  - As defined by angle of repose, temperature at which it is free flowing and physical composition.
- Hazardous waste.
- Restricted solid waste.
- General solid waste (putrescible).
- General solid waste (non-putrescible).

Classification begins with determination of whether the waste is 'special waste'. If not determination of whether material is classified as liquid waste is then required. Material which is not liquid waste, or is special waste due to asbestos content, must be compared to pre-classification definitions. Without pre-classification, the potential for hazardous characteristics (such as explosives, gases, flammable materials, oxidising, toxic and corrosive substances) must be established. If material cannot be classified as hazardous, assessment by chemical analysis must be undertaken. Without assessment, material must be managed as if hazardous waste.

Chemical classification is two tiered. The first set of criteria is based on total contaminant concentrations, whereas the second set of criteria is based on a leachable (TCLP) concentration and a total contaminant concentration. The total concentrations criteria are generally higher in conjunction with TCLP testing than if it was not undertaken.

Appendix C

Quality Assurance Review and Laboratory Report Sheets

A total of five (5) soil duplicate samples were submitted blind to the laboratory for analysis with the samples, comprising one (1) interlaboratory and four (4) intralaboratory duplicates.

- All five (5) duplicate samples were analysed for TRH, BTEX, PAH and metals. This represents a percentage slightly in excess of 10%, which is in accordance with the frequency recommended by the Australian Standard AS 4482.1 (Ref [13]) and RCA protocol although the split between inter- and intralaboratory duplicates was unequal. This is not considered to represent uncertainty in the results.
- It is noted that the labels QA1 and QA2 were used twice in error: as the samples were collected on different days, and the sample labels included the sample date, RCA was able to distinguish which sample was which and there is no uncertainty with regards to the results.

Two (2) trip blanks and two (2) trip spikes were submitted. This submission is in accordance with the frequency recommended by the Australian Standard AS 4482.1 (Ref [13]) and RCA protocol.

RCA omitted the field blank due to the low potential for cross contamination from field conditions and the equipment wash due to the low potential for cross contamination from the sampling equipment.

Results, as shown further in this **Appendix**, indicate a total of two (2) soil analyses which report RPD in excess of the acceptance criteria:

- HA5B/QA1[2] Reported an elevated RPD for arsenic. This sample is described as topsoil comprising silty sand and organic material and it is therefore considered that sample heterogeneity is the likely cause of the high RPD. There is some uncertainty associated with this sample, however the sample reported the highest concentration and therefore the uncertainty is considered to be conservative. It is also noted that both results were well below the relevant criteria and therefore the uncertainty is not considered to be significant.
- RP103/QA5 Reported elevated RPD for chrysene, indeno(1,2,3-c,d)pyrene and benzo(g,h,i)perylene. This sample is described as fill material (road pavement) with silt, sand and large portions of gravel, therefore it is considered that sample heterogeneity is the likely cause of the high RPD. There is some uncertainty associated with this sample and whilst the duplicate reported the highest concentration, all results were well below the relevant criteria and therefore the uncertainty is not considered to be significant.

Results show the trip blank samples with non-detectable concentrations of analytes and as such it is not considered that there was potential cross contamination during the transport of samples.

Results show the trip spike and trip spike control reported RPD acceptable for intralaboratory duplicates and therefore it is considered that there has been negligible loss of volatile compounds during the trip.

[2] QA1 sample taken while conducting environmental hand augers on 2 October 2019

ALS was chosen as the primary laboratory and EnviroLab was chosen as the secondary laboratory.

All laboratories used for analysis are NATA accredited and are experienced in the analytical requirements for potentially contaminated soil.

ALS undertook internal quality assurance testing. Results are contained within the laboratory report sheets, included in this **Appendix**. **Table 4** presents a summary of their review.

Table 4 *Internal Quality Assurance Review*

	Number Samples (including QA)	Laboratory Duplicates	Spikes	Laboratory Control Samples	Laboratory Blanks
Requirement		**10%**	**5%**	**One every batch**	**One every batch**
Soil					
Metals (As, Cd, Cr, Cu, Ni, Pb, Zn)	52	5 (4)	3 (1)	4	4
Mercury	52	5 (2)	3 (1)	4	4
TRH C_6-C_{10}	54	6 (1)	3 (1)	4	4
TRH >C_{10}-C_{40}	52	5 (5)	2 (3)	5	5
BTEX	54	6 (1)	3 (1)	4	4
PAH	52	5 (4)	2 (3)	6	6

Numbers in brackets refer the tests undertaken on samples not from this project but within the same laboratory batch. The number of QA testing done is the sum of the numbers inside and outside of the brackets.

Examination of the above table reveals that ALS have undertaken laboratory quality assurance testing in accordance with the ASC NEPM (Ref [9]).

- Recoveries of Surrogates were within acceptance criteria of 70-130% with the exception of:
  - ES1932342 1.2 Dichloroethae-D4 (TPH (V)/BTEX Surrogate) in sample HA4 which reported a recovery of 134%. This is considered a minor, conservative non-compliance and therefore uncertainty in not considered significant.
- Holding Times were within laboratory specified time frames.
- Recoveries of laboratory control samples were within the acceptance criteria of 70-130%.
- Recoveries of Spikes were within acceptance criteria of 70-130%.
- No Laboratory Blank result was detected above the practical quantification limit (PQL).

It is therefore considered that the data obtained from this testing is generally accurate and reliable and is adequate to characterise the site.

Quality Assurance Type	Primary PQL	Secondary PQL	Intralaboratory Duplicate		RPD %	Intralaboratory Duplicate		RPD %	Intralaboratory Duplicate		RPD %	Intralaboratory Duplicate		RPD %	Interlaboratory Duplicate		RPD %	Trip Spike		RPD %	Trip Spike		RPD %	Trip Blank	Trip Blank
Sample Identification			BH102A	QA1		BH104A	QA2		HA5B	QA1		HA10A	QA2		RP103	QA5		TS1	TSC1		TS2	TSC2		TB1	TB2
Sample Depth (m)			0.1			0.1			0.1			0.1			0.1			NA			NA			--	--
Date			24/9/19			30/9/19			2/10/19			2/10/19			9/10/19			1/10/19			2/10/19			2/10/19	9/10/19
Sample Profile			FILL, Silty SAND, fine-medium grained, brown, with trace rootlets			SLOPEWASH, Silty SAND, fine-medium grained, brown, trace of fine-medium grade gravel			CLAY, pale grey with red/orange mottling			Sandy CLAY, grey, trace of gravel and rootlets			FILL, silty sandy GRAVEL, fine to medium subangular, grey, fine to medium grained sand			Sand			Sand			Sand	Sand
Sample Purpose			Investigation			Investigation			Investigation			Investigation			Investigation Proposed Road Alignment			Quality Assurance			Quality Assurance			Quality Assurance	Quality Assurance
Sample collected by			RCA-RC			RCA - RC			RCA - ZL			RCA - ZL			RCA - BG			Laboratory			Laboratory			Laboratory	Laboratory
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																									
Benzene	0.5	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	<0.2	<0.2
Toluene	0.5	0.5	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	24.1	25.4	5.3	12.2	16.6	30.6	<0.5	<0.5
Ethylbenzene	0.5	1	0.5	0.25	66.7	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	4.4	4.5	2.2	2.4	3.2	28.6	<0.5	<0.5
meta- and para-Xylene	0.5	2	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	1	120.0	24.2	24.5	1.2	12.2	16.2	28.2	<0.5	<0.5
ortho-Xylene	0.5	1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	9.5	9.8	3.1	5.2	6.9	28.1	<0.5	<0.5
Total Xylenes	1	3	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	1.5	100.0	33.7	34.3	1.8	17.4	23.1	28.1	--	--
Polycyclic Aromatic Hydrocarbons (PAH)																									
Naphthalene	1	1	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	--	--	--	--	--	--	<1	<1
Total Recoverable Hydrocarbons (TRH)																									
TRH C_6-C_{10}	10	25	5	5	0.0	5	5	0.0	5	5	0.0	5	5	0.0	5	12.5	85.7	115	120	4.3	72	102	34.5	<10	<10
TRH >C_{10}-C_{16}	50	50	25	25	0.0	25	25	0.0	25	25	0.0	25	25	0.0	25	25	0.0	--	--	--	--	--	--	--	--
TRH >C_{16}-C_{34}	100	100	50	50	0.0	50	50	0.0	50	50	0.0	140	50	94.7	50	50	0.0	--	--	--	--	--	--	--	--
TRH >C_{34}-C_{40}	100	100	50	50	0.0	50	50	0.0	50	50	0.0	50	50	0.0	50	50	0.0	--	--	--	--	--	--	--	--
F1	10	25	5	5	0.0	5	5	0.0	5	5	0.0	5	5	0.0	5	12.5	85.7	--	--	--	--	--	--	--	--
F2	50	50	25	25	0.0	25	25	0.0	25	25	0.0	25	25	0.0	25	25	0.0	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAH)																									
Naphthalene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	--	--	--	--	--	--	--	--
Acenaphthylene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	--	--	--	--	--	--	--	--
Acenaphthene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	--	--	--	--	--	--	--	--
Fluorene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	--	--	--	--	--	--	--	--
Phenanthrene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.3	18.2	--	--	--	--	--	--	--	--
Anthracene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.1	85.7	--	--	--	--	--	--	--	--
Fluoranthene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	1.3	1.4	7.4	--	--	--	--	--	--	--	--
Pyrene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	1.2	1.3	8.0	--	--	--	--	--	--	--	--
Benz(a)anthracene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.5	0.9	57.1	--	--	--	--	--	--	--	--
Chrysene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.6	**82.4**	--	--	--	--	--	--	--	--
Benzo(b)&(j)fluoranthene	0.5	0.2	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.8	1	4.9	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	0.5		0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25			--	--	--	--	--	--	--	--
Benzo(a) pyrene	0.5	0.05	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.7	1	35.3	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.6	**82.4**	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.5	66.7	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	0.5	0.1	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.25	0.0	0.25	0.7	**94.7**	--	--	--	--	--	--	--	--
Carcinogenic PAH (B(a)P equivalent)	1.21	0.192	0.605	0.605	0.0	0.605	0.605	0.0	0.605	0.605	0.0	0.605	0.605	0.0	1.135	1.763	43.3	--	--	--	--	--	--	--	
Sum of reported PAH	8	1.55	4	4	0.0	4	4	0.0	4	4	0.0	4	4	0.0	7.25	10.4	35.7	--	--	--	--	--	--	--	--
Metals																									
Arsenic	5	4	7	7	0.0	8	7	13.3	11	2.5	**125.9**	5	2.5	66.7	2.5	2	22.2	--	--	--	--	--	--	--	--
Cadmium	1	0.4	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.2	85.7	--	--	--	--	--	--	--	--
Chromium	2	1	13	14	7.4	6	5	18.2	8	6	28.6	4	4	0.0	22	26	16.7	--	--	--	--	--	--	--	--
Copper	5	1	20	18	10.5	11	11	0.0	2.5	2.5	0.0	10	8	22.2	9	10	10.5	--	--	--	--	--	--	--	--
Mercury	0.1	0.1	0.05	0.05	0.0	0.05	0.05	0.0	0.05	0.05	0.0	0.05	0.05	0.0	0.05	0.05	0.0	--	--	--	--	--	--	--	--
Lead	5	1	20	18	10.5	14	12	15.4	9	8	11.8	23	20	14.0	16	11	37.0	--	--	--	--	--	--	--	--
Nickel	2	1	5	5	0.0	4	3	28.6	1	1	0.0	2	1	66.7	6	6	0.0	--	--	--	--	--	--	--	--
Zinc	5	1	73	71	2.8	35	32	9.0	2.5	2.5	0.0	45	38	16.9	64	47	30.6	--	--	--	--	--	--	--	--

All units in mg/kg

BOLD identifies where RPD results

***BOLD identified where** blanks >PQL*

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

Results underlined were not detected and are reported as half the detection limit for statistical purpose.

intralaboratory	*interlaboratory*	
>50	*>60*	*where sample results are >10 x PQL*
>75	*>85*	*where sample results are > 5 to ≤10 x PQL*
>100	*>100*	*where sample results are >2 to ≤5 x PQL*
*AD>2.5 * PQL*		*where sample results are ≤2 x PQL*

Where results are within two of the above ranges the most conservative criteria have been used to assess duplicate performance

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1932342**	Page	: 1 of 28
Amendment	: **1**		
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019 13:16
Order number	: ----	Date Analysis Commenced	: 05-Oct-2019
C-O-C number	: ----	Issue Date	: 28-Oct-2019 17:41
Sampler	: ZAC LAUGHLAN		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 41		
No. of samples analysed	: 41		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Rassem Ayoubi	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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075(SIM): LOR has been raised due to high moisture content.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH101A	BH102A	BH102C	BH103A	BH103C
			Client sampling date / time	02-Oct-2019 00:00	24-Sep-2019 00:00	24-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-001	ES1932342-002	ES1932342-003	ES1932342-004	ES1932342-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.1	25.2	16.4	22.9	13.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	7	6	<5	8
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	4	13	8	4	6
Copper	7440-50-8	5	mg/kg	8	20	<5	29	12
Lead	7439-92-1	5	mg/kg	12	20	12	19	<5
Nickel	7440-02-0	2	mg/kg	<2	5	3	3	4
Zinc	7440-66-6	5	mg/kg	23	73	8	41	34
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH101A	BH102A	BH102C	BH103A	BH103C
			Client sampling date / time	02-Oct-2019 00:00	24-Sep-2019 00:00	24-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-001	ES1932342-002	ES1932342-003	ES1932342-004	ES1932342-005
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	**0.5**	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	**0.5**	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**71.3**	**86.9**	**87.0**	**86.4**	**82.0**
2-Chlorophenol-D4	93951-73-6	0.5	%	**85.4**	**86.0**	**86.4**	**88.2**	**89.9**
2.4.6-Tribromophenol	118-79-6	0.5	%	**89.0**	**73.3**	**69.7**	**75.7**	**79.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**101**	**102**	**95.6**	**103**	**104**
Anthracene-d10	1719-06-8	0.5	%	**96.0**	**96.0**	**96.4**	**99.5**	**104**
4-Terphenyl-d14	1718-51-0	0.5	%	**104**	**90.5**	**89.4**	**100**	**88.1**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**87.4**	**112**	**90.3**	**113**	**117**
Toluene-D8	2037-26-5	0.2	%	**96.0**	**130**	**104**	**94.1**	**99.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH101A	BH102A	BH102C	BH103A	BH103C
			Client sampling date / time	02-Oct-2019 00:00	24-Sep-2019 00:00	24-Sep-2019 00:00	25-Sep-2019 00:00	25-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-001	ES1932342-002	ES1932342-003	ES1932342-004	ES1932342-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**86.3**	**121**	**104**	**78.9**	**87.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH104A	BH105A	BH105C	BH106A	BH107A
			Client sampling date / time	30-Sep-2019 00:00	26-Sep-2019 00:00	26-Sep-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-006	ES1932342-007	ES1932342-008	ES1932342-009	ES1932342-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	11.6	9.0	21.6	6.0	63.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	6	7	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	6	6	7	12
Copper	7440-50-8	5	mg/kg	11	12	<5	8	21
Lead	7439-92-1	5	mg/kg	14	13	7	6	13
Nickel	7440-02-0	2	mg/kg	4	4	<2	6	4
Zinc	7440-66-6	5	mg/kg	35	41	7	42	96
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.8
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	1.0
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.9
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH104A	BH105A	BH105C	BH106A	BH107A
			Client sampling date / time	30-Sep-2019 00:00	26-Sep-2019 00:00	26-Sep-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-006	ES1932342-007	ES1932342-008	ES1932342-009	ES1932342-010
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	120	100	210
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	310	370
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	120	410	580
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	130	260	380
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	550	550
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	130	810	930
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	65.9	72.8	68.9	69.0	67.6
2-Chlorophenol-D4	93951-73-6	0.5	%	77.1	87.0	81.2	83.0	67.8
2.4.6-Tribromophenol	118-79-6	0.5	%	86.0	92.8	92.8	85.3	91.6
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	102	106	103	106	99.1
Anthracene-d10	1719-06-8	0.5	%	94.8	100	98.3	97.9	93.5
4-Terphenyl-d14	1718-51-0	0.5	%	101	102	104	99.4	99.3
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	104	124	126	109	85.9
Toluene-D8	2037-26-5	0.2	%	117	111	102	115	93.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH104A	BH105A	BH105C	BH106A	BH107A
			Client sampling date / time	30-Sep-2019 00:00	26-Sep-2019 00:00	26-Sep-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-006	ES1932342-007	ES1932342-008	ES1932342-009	ES1932342-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**108**	**93.5**	**91.2**	**107**	**82.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH108A	BH109A	BH109C	BH109D	QA1
			Client sampling date / time	02-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	24-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-011	ES1932342-012	ES1932342-013	ES1932342-014	ES1932342-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	12.0	19.1	13.8	23.7	27.6
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	5	9	<5	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	87	5	6	3	14
Copper	7440-50-8	5	mg/kg	50	13	14	7	18
Lead	7439-92-1	5	mg/kg	78	19	18	<5	18
Nickel	7440-02-0	2	mg/kg	11	2	3	<2	5
Zinc	7440-66-6	5	mg/kg	334	44	38	7	71
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	2.2	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	6.9	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	6.6	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	2.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	2.4	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	3.4	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.2	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	2.9	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	2.0	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	2.8	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	34.2	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	3.9	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	4.1	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	4.4	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH108A	BH109A	BH109C	BH109D	QA1
			Client sampling date / time	02-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	24-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-011	ES1932342-012	ES1932342-013	ES1932342-014	ES1932342-015
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	**120**	**100**	**170**	<100	<100
C29 - C36 Fraction	----	100	mg/kg	**180**	**120**	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**300**	**220**	**170**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	**190**	**150**	**180**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	**170**	**160**	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**360**	**310**	**180**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**70.1**	**72.5**	**70.3**	**68.1**	**83.4**
2-Chlorophenol-D4	93951-73-6	0.5	%	**75.5**	**79.6**	**81.5**	**76.2**	**82.0**
2.4.6-Tribromophenol	118-79-6	0.5	%	**76.4**	**97.3**	**91.9**	**82.1**	**66.0**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**103**	**107**	**101**	**92.7**	**94.2**
Anthracene-d10	1719-06-8	0.5	%	**94.5**	**97.3**	**98.7**	**96.1**	**99.8**
4-Terphenyl-d14	1718-51-0	0.5	%	**103**	**106**	**101**	**91.8**	**88.7**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**101**	**105**	**89.8**	**116**	**88.8**
Toluene-D8	2037-26-5	0.2	%	**109**	**111**	**96.2**	**88.4**	**95.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH108A	BH109A	BH109C	BH109D	QA1
			Client sampling date / time	02-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	01-Oct-2019 00:00	24-Sep-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-011	ES1932342-012	ES1932342-013	ES1932342-014	ES1932342-015
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**100**	**100**	**89.5**	**88.9**	**97.6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QA2	HA1A	HA2A	HA3A	HA3B
			Client sampling date / time	30-Sep-2019 00:00	01-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-016	ES1932342-017	ES1932342-018	ES1932342-019	ES1932342-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	12.5	18.7	15.9	11.6	20.0
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	5	3	47	3	5
Copper	7440-50-8	5	mg/kg	11	9	13	12	<5
Lead	7439-92-1	5	mg/kg	12	15	13	12	10
Nickel	7440-02-0	2	mg/kg	3	<2	5	<2	<2
Zinc	7440-66-6	5	mg/kg	32	26	100	23	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QA2	HA1A	HA2A	HA3A	HA3B
			Client sampling date / time	30-Sep-2019 00:00	01-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-016	ES1932342-017	ES1932342-018	ES1932342-019	ES1932342-020
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	**170**	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**190**	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**360**	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	**110**	**270**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**240**	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	**110**	**510**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**71.4**	**69.9**	**72.8**	**73.0**	**70.2**
2-Chlorophenol-D4	93951-73-6	0.5	%	**77.6**	**76.0**	**78.9**	**78.6**	**74.1**
2.4.6-Tribromophenol	118-79-6	0.5	%	**80.8**	**81.9**	**75.2**	**78.8**	**71.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**99.8**	**96.1**	**99.7**	**106**	**94.4**
Anthracene-d10	1719-06-8	0.5	%	**93.4**	**94.6**	**98.0**	**105**	**94.3**
4-Terphenyl-d14	1718-51-0	0.5	%	**122**	**89.1**	**94.3**	**108**	**96.6**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**117**	**119**	**98.1**	**119**	**112**
Toluene-D8	2037-26-5	0.2	%	**88.4**	**97.4**	**108**	**97.8**	**96.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QA2	HA1A	HA2A	HA3A	HA3B
			Client sampling date / time	30-Sep-2019 00:00	01-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-016	ES1932342-017	ES1932342-018	ES1932342-019	ES1932342-020
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**87.8**	**90.4**	**105**	**88.4**	**83.7**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4A	HA5A	HA5B	HA6A	HA7A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-021	ES1932342-022	ES1932342-023	ES1932342-024	ES1932342-025
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	10.0	19.4	18.0	11.2	11.3
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	5	7	11	<5	8
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	4	8	8	8	6
Copper	7440-50-8	5	mg/kg	13	6	<5	7	14
Lead	7439-92-1	5	mg/kg	21	9	9	12	22
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	3	4
Zinc	7440-66-6	5	mg/kg	32	21	<5	38	66
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4A	HA5A	HA5B	HA6A	HA7A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-021	ES1932342-022	ES1932342-023	ES1932342-024	ES1932342-025
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	**130**	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	**220**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	**350**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	**200**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	**310**	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	**510**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**72.8**	**79.0**	**75.0**	**75.6**	**76.2**
2-Chlorophenol-D4	93951-73-6	0.5	%	**75.6**	**78.1**	**76.3**	**78.7**	**78.2**
2.4.6-Tribromophenol	118-79-6	0.5	%	**85.6**	**88.2**	**81.8**	**92.4**	**77.5**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**97.1**	**91.3**	**98.7**	**101**	**107**
Anthracene-d10	1719-06-8	0.5	%	**94.8**	**100**	**99.3**	**96.2**	**101**
4-Terphenyl-d14	1718-51-0	0.5	%	**102**	**106**	**106**	**102**	**125**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**134**	**121**	**126**	**101**	**101**
Toluene-D8	2037-26-5	0.2	%	**103**	**95.5**	**102**	**114**	**118**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA4A	HA5A	HA5B	HA6A	HA7A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-021	ES1932342-022	ES1932342-023	ES1932342-024	ES1932342-025
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**96.4**	**86.7**	**97.3**	**122**	**130**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA8A	HA8B	HA9A	HA10A	HA10B
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-026	ES1932342-027	ES1932342-028	ES1932342-029	ES1932342-030
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	9.8	20.7	15.0	9.7	18.3
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	6	5	5	7
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	12	6	4	4	7
Copper	7440-50-8	5	mg/kg	13	<5	20	10	<5
Lead	7439-92-1	5	mg/kg	13	11	28	23	10
Nickel	7440-02-0	2	mg/kg	4	<2	2	2	<2
Zinc	7440-66-6	5	mg/kg	46	8	44	45	8
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA8A	HA8B	HA9A	HA10A	HA10B
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-026	ES1932342-027	ES1932342-028	ES1932342-029	ES1932342-030
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	**120**	**100**	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	**120**	**100**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	**140**	**140**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	**160**	<100	**100**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	**300**	**140**	**100**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**93.2**	**88.5**	**87.8**	**89.5**	**91.2**
2-Chlorophenol-D4	93951-73-6	0.5	%	**86.0**	**85.2**	**84.2**	**80.3**	**84.7**
2.4.6-Tribromophenol	118-79-6	0.5	%	**103**	**99.4**	**101**	**90.2**	**94.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**97.8**	**96.4**	**94.7**	**95.9**	**95.1**
Anthracene-d10	1719-06-8	0.5	%	**91.3**	**91.0**	**91.8**	**85.5**	**92.3**
4-Terphenyl-d14	1718-51-0	0.5	%	**92.6**	**92.1**	**84.7**	**90.0**	**92.8**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**101**	**94.8**	**104**	**107**	**102**
Toluene-D8	2037-26-5	0.2	%	**117**	**106**	**117**	**120**	**117**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA8A	HA8B	HA9A	HA10A	HA10B
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-026	ES1932342-027	ES1932342-028	ES1932342-029	ES1932342-030
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**123**	**115**	**119**	**123**	**124**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA11A	HA11B	QA1	QA2	SP1A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-031	ES1932342-032	ES1932342-033	ES1932342-034	ES1932342-035
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	9.8	10.0	16.1	9.1	19.1
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	8	9	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	8	10	6	4	4
Copper	7440-50-8	5	mg/kg	35	33	<5	8	18
Lead	7439-92-1	5	mg/kg	25	26	8	20	26
Nickel	7440-02-0	2	mg/kg	4	4	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	70	68	<5	38	34
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA11A	HA11B	QA1	QA2	SP1A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-031	ES1932342-032	ES1932342-033	ES1932342-034	ES1932342-035
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	**100**	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	**100**	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	**100**	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	**140**	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	**240**	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**93.5**	**98.0**	**102**	**96.5**	**102**
2-Chlorophenol-D4	93951-73-6	0.5	%	**86.5**	**88.8**	**84.0**	**95.4**	**82.8**
2.4.6-Tribromophenol	118-79-6	0.5	%	**84.5**	**94.7**	**85.6**	**98.6**	**99.0**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**86.6**	**98.0**	**92.5**	**93.7**	**91.6**
Anthracene-d10	1719-06-8	0.5	%	**82.8**	**94.6**	**90.0**	**90.0**	**91.0**
4-Terphenyl-d14	1718-51-0	0.5	%	**80.4**	**96.9**	**93.5**	**90.1**	**88.7**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**108**	**113**	**103**	**110**	**92.0**
Toluene-D8	2037-26-5	0.2	%	**122**	**113**	**116**	**120**	**101**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	HA11A	HA11B	QA1	QA2	SP1A
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-031	ES1932342-032	ES1932342-033	ES1932342-034	ES1932342-035
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	127	118	122	126	108

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SP1B	SP2A	SP2B	TB1	TS1
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	01-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-036	ES1932342-037	ES1932342-038	ES1932342-039	ES1932342-040
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	28.2	21.2	17.1	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	3	6	3	----	----
Copper	7440-50-8	5	mg/kg	18	13	<5	----	----
Lead	7439-92-1	5	mg/kg	38	23	30	----	----
Nickel	7440-02-0	2	mg/kg	<2	3	<2	----	----
Zinc	7440-66-6	5	mg/kg	43	36	<5	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	94

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SP1B	SP2A	SP2B	TB1	TS1
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	01-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-036	ES1932342-037	ES1932342-038	ES1932342-039	ES1932342-040
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	**110**	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**110**	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	**115**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	**53**
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	**100**	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	**160**	**130**	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**260**	**130**	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**24.1**
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**4.4**
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**24.2**
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**9.5**
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	**62.2**
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**33.7**
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**102**	**86.8**	**102**	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**82.1**	**89.6**	**84.2**	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**86.9**	**93.7**	**80.7**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**89.9**	**101**	**95.8**	----	----
Anthracene-d10	1719-06-8	0.5	%	**86.7**	**89.6**	**92.5**	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**87.0**	**96.3**	**94.4**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**92.4**	**99.7**	**102**	**97.9**	**102**
Toluene-D8	2037-26-5	0.2	%	**105**	**111**	**115**	**108**	**116**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SP1B	SP2A	SP2B	TB1	TS1
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	02-Oct-2019 00:00	01-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1932342-036	ES1932342-037	ES1932342-038	ES1932342-039	ES1932342-040
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**110**	**116**	**121**	**116**	**121**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TSC1	----	----	----	----
			Client sampling date / time	01-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1932342-041	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	99	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	120	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	56	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	25.4	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	4.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	24.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	9.8	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	64.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	34.3	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	99.7	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	111	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	116	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) 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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1932342**	Page	: 1 of 17
Amendment	: **1**		
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019
Order number	: ----	Date Analysis Commenced	: 05-Oct-2019
C-O-C number	: ----	Issue Date	: 28-Oct-2019
Sampler	: ZAC LAUGHLAN		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 41		
No. of samples analysed	: 41		

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*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Rassem Ayoubi	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

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 (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2627463)									
ES1932342-001	BH101A	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	4	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	6	17.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	7	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	11	10.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	23	21	9.24	No Limit
ES1932342-011	BH108A	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	87	82	6.02	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	11	13	20.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	50	57	12.6	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	78	80	2.24	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	334	319	4.62	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2627465)									
ES1932342-021	HA4A	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	3	26.9	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	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	13	13	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	21	18	11.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	32	30	7.32	No Limit
ES1932342-031	HA11A	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	8	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.00	No Limit

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 (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2627465) - continued									
ES1932342-031	HA11A	EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	35	38	8.37	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	25	28	11.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	70	76	6.96	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2627467)									
ES1932342-003	BH102C	EA055: Moisture Content	----	0.1	%	16.4	19.4	16.9	0% - 50%
ES1932342-014	BH109D	EA055: Moisture Content	----	0.1	%	23.7	23.8	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2627468)									
ES1932342-023	HA5B	EA055: Moisture Content	----	0.1	%	18.0	17.4	3.04	0% - 50%
ES1932342-034	QA2	EA055: Moisture Content	----	0.1	%	9.1	8.8	3.24	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2627464)									
ES1932342-001	BH101A	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1932342-011	BH108A	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.2	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2627466)									
ES1932342-021	HA4A	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1932342-031	HA11A	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2624365)									
ES1931452-005	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
ES1932515-001	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

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 (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2624365) - continued									
ES1932515-001	Anonymous	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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2624431)									
ES1932297-001	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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2625701)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2625701) - continued									
ES1932342-001	BH101A	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
ES1932342-016	QA2	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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2625711)									
ES1932342-026	HA8A	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
ES1932342-036	SP1B	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

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 Petroleum Hydrocarbons (QC Lot: 2624364)									
ES1931452-005	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
ES1932515-001	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 Petroleum Hydrocarbons (QC Lot: 2624430)									
ES1932111-003	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
ES1932297-001	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 Petroleum Hydrocarbons (QC Lot: 2624437)									
ES1932342-002	BH102A	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2624688)									
ES1932342-001	BH101A	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1932342-013	BH109C	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2624689)									
ES1932342-024	HA6A	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1932342-034	QA2	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2625702)									
ES1932342-001	BH101A	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
ES1932342-016	QA2	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 Petroleum Hydrocarbons (QC Lot: 2625710)									
ES1932342-026	HA8A	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
ES1932342-036	SP1B	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	110	120	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: 2624364)									
ES1931452-005	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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2624364) - continued									
ES1932515-001	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2624430)									
ES1932111-003	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
ES1932297-001	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2624437)									
ES1932342-002	BH102A	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: 2624688)									
ES1932342-001	BH101A	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1932342-013	BH109C	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: 2624689)									
ES1932342-024	HA6A	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1932342-034	QA2	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: 2625702)									
ES1932342-001	BH101A	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
ES1932342-016	QA2	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2625710)									
ES1932342-026	HA8A	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
ES1932342-036	SP1B	EP071: >C16 - C34 Fraction	----	100	mg/kg	100	110	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	160	170	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2624437)									
ES1932342-002	BH102A	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	0.6	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

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: BTEXN (QC Lot: 2624437) - continued									
ES1932342-002	BH102A	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP080: BTEXN (QC Lot: 2624688)									
ES1932342-001	BH101A	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
ES1932342-013	BH109C	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
EP080: BTEXN (QC Lot: 2624689)									
ES1932342-024	HA6A	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
ES1932342-034	QA2	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

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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2627463)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	101	86.0	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.6	83.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	91.7	76.0	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	98.7	86.0	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	100	80.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	102	87.0	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	103	80.0	122
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2627465)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	100	86.0	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	101	83.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.0	76.0	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	104	86.0	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	99.2	80.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	87.0	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	106	80.0	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2627464)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	74.4	70.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2627466)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.5	70.0	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2624365)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	92.6	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	92.5	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	94.2	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.8	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.3	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	91.3	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.1	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	91.3	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.7	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	91.9	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	88.5	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	93.1	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	93.0	70.0	126

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: 2624365) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.6	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	83.9	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.2	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2624431)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	90.2	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	91.5	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.2	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	90.8	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	96.6	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	92.3	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	89.5	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	94.2	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	93.8	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	89.4	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	91.6	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	94.8	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	98.2	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	96.9	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	91.8	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	99.3	63.0	121
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2625701)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	111	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	90.9	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	98.0	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	98.6	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	101	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	104	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	113	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	111	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	94.6	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	104	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	77.8	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	91.0	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	102	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	107	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	99.4	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	118	63.0	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: 2625711)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	98.8	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	95.4	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	93.0	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	98.4	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	95.9	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	99.0	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.8	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	97.1	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	97.2	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	91.5	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	92.3	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	90.8	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	97.0	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	83.7	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.8	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	86.2	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624364)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	88.1	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	88.3	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	97.7	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624430)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	91.3	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	94.3	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	89.1	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624437)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	79.7	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624688)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	89.9	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624689)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	88.2	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2625702)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	93.8	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	90.0	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	86.1	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2625710)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	88.6	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	91.9	77.0	131

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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2625710) - continued								
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	94.4	71.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624364)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	89.1	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	89.7	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	112	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624430)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	92.9	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	93.7	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	75.8	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624437)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	80.3	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624688)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	91.6	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624689)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	92.4	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2625702)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	94.6	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	92.0	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	86.4	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2625710)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	90.0	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	93.2	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	100	63.0	131
EP080: BTEXN (QCLot: 2624437)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	82.2	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	89.2	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.7	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	90.3	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	91.7	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	97.7	63.0	119
EP080: BTEXN (QCLot: 2624688)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	90.4	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	94.8	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.8	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.7	66.0	118

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
EP080: BTEXN (QCLot: 2624688) - continued								
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	95.5	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	95.2	63.0	119
EP080: BTEXN (QCLot: 2624689)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.1	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	97.6	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	97.8	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	101	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	98.7	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	101	63.0	119

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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2627463)							
ES1932342-001	BH101A	EG005T: Arsenic	7440-38-2	50 mg/kg	91.4	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.6	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	97.0	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	97.9	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	96.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	99.5	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	100	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2627465)							
ES1932342-021	HA4A	EG005T: Arsenic	7440-38-2	50 mg/kg	90.5	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.4	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	95.2	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	95.7	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	94.8	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.1	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	96.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2627464)							
ES1932342-001	BH101A	EG035T: Mercury	7439-97-6	5 mg/kg	80.0	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2627466)							
ES1932342-021	HA4A	EG035T: Mercury	7439-97-6	5 mg/kg	81.5	70.0	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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2624365)							
ES1931452-005	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	93.1	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	96.4	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2624431)							
ES1932297-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	93.2	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	99.4	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2625701)							
ES1932342-001	BH101A	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	97.5	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	112	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2625711)							
ES1932342-026	HA8A	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.8	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	99.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624364)							
ES1931452-005	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	81.2	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	90.9	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	88.3	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624430)							
ES1932297-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	87.6	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	102	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	105	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624437)							
ES1932342-002	BH102A	EP080: C6 - C9 Fraction	----	32.5 mg/kg	71.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624688)							
ES1932342-001	BH101A	EP080: C6 - C9 Fraction	----	32.5 mg/kg	82.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624689)							
ES1932342-024	HA6A	EP080: C6 - C9 Fraction	----	32.5 mg/kg	98.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2625702)							
ES1932342-001	BH101A	EP071: C10 - C14 Fraction	----	523 mg/kg	88.3	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	95.0	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	94.5	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2625710)							
ES1932342-026	HA8A	EP071: C10 - C14 Fraction	----	523 mg/kg	87.7	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	94.0	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	96.3	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624364)							
ES1931452-005	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	93.3	73.0	137

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624364) - continued							
ES1931452-005	Anonymous	EP071: >C16 - C34 Fraction	----	3223 mg/kg	88.5	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	77.6	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624430)							
ES1932297-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	91.8	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	99.8	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	108	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624437)							
ES1932342-002	BH102A	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	71.4	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624688)							
ES1932342-001	BH101A	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	81.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2624689)							
ES1932342-024	HA6A	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	96.5	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2625702)							
ES1932342-001	BH101A	EP071: >C10 - C16 Fraction	----	860 mg/kg	99.1	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	95.1	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	96.8	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2625710)							
ES1932342-026	HA8A	EP071: >C10 - C16 Fraction	----	860 mg/kg	88.3	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	90.7	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	105	52.0	132
EP080: BTEXN (QCLot: 2624437)							
ES1932342-002	BH102A	EP080: Benzene	71-43-2	2.5 mg/kg	73.4	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	82.2	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	86.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	84.4	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	85.5	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	71.5	70.0	130
EP080: BTEXN (QCLot: 2624688)							
ES1932342-001	BH101A	EP080: Benzene	71-43-2	2.5 mg/kg	71.8	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	72.2	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	74.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	73.6	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	74.6	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	74.2	70.0	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: BTEXN (QCLot: 2624689)							
ES1932342-024	HA6A	EP080: Benzene	71-43-2	2.5 mg/kg	88.6	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	97.4	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	100.0	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	102	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	101	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	82.4	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1932342**	Page	: 1 of 11
Amendment	: **1**		
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019
Site	: ----	Issue Date	: 28-Oct-2019
Sampler	: ZAC LAUGHLAN	No. of samples received	: 41
Order number	: ----	No. of samples analysed	: 41

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.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP080S: TPH(V)/BTEX Surrogates	ES1932342-021	HA4A	**1.2-Dichloroethane-D4**	17060-07-0	134 %	72.8-133 %	**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: **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)								
BH109A,	BH109C,	**01-Oct-2019**	**----**	----	----	**08-Oct-2019**	15-Oct-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EA055)								
BH101A,	BH106A,	**02-Oct-2019**	**----**	----	----	**08-Oct-2019**	16-Oct-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EA055)								
BH102A,	BH102C,	**24-Sep-2019**	**----**	----	----	**08-Oct-2019**	08-Oct-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EA055)								
BH103A,	BH103C	**25-Sep-2019**	**----**	----	----	**08-Oct-2019**	09-Oct-2019	✓
Soil Glass Jar - Unpreserved (EA055)								
BH105A,	BH105C	**26-Sep-2019**	**----**	----	----	**08-Oct-2019**	10-Oct-2019	✓
Soil Glass Jar - Unpreserved (EA055)								
BH104A,	QA2	**30-Sep-2019**	**----**	----	----	**08-Oct-2019**	14-Oct-2019	✓

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
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH109A,	BH109C,	**01-Oct-2019**	**08-Oct-2019**	29-Mar-2020	✓	**09-Oct-2019**	29-Mar-2020	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EG005T)								
BH101A,	BH106A,	**02-Oct-2019**	**08-Oct-2019**	30-Mar-2020	✓	**09-Oct-2019**	30-Mar-2020	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EG005T)								
BH102A,	BH102C,	**24-Sep-2019**	**08-Oct-2019**	22-Mar-2020	✓	**09-Oct-2019**	22-Mar-2020	✓
QA1								
Soil Glass Jar - Unpreserved (EG005T)								
BH103A,	BH103C	**25-Sep-2019**	**08-Oct-2019**	23-Mar-2020	✓	**09-Oct-2019**	23-Mar-2020	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH105A,	BH105C	**26-Sep-2019**	**08-Oct-2019**	24-Mar-2020	✓	**09-Oct-2019**	24-Mar-2020	✓
Soil Glass Jar - Unpreserved (EG005T)								
BH104A,	QA2	**30-Sep-2019**	**08-Oct-2019**	28-Mar-2020	✓	**09-Oct-2019**	28-Mar-2020	✓

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
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH109A,	BH109C,	**01-Oct-2019**	**08-Oct-2019**	29-Oct-2019	✓	**09-Oct-2019**	29-Oct-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EG035T)								
BH101A,	BH106A,	**02-Oct-2019**	**08-Oct-2019**	30-Oct-2019	✓	**09-Oct-2019**	30-Oct-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EG035T)								
BH102A,	BH102C,	**24-Sep-2019**	**08-Oct-2019**	22-Oct-2019	✓	**09-Oct-2019**	22-Oct-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EG035T)								
BH103A,	BH103C	**25-Sep-2019**	**08-Oct-2019**	23-Oct-2019	✓	**09-Oct-2019**	23-Oct-2019	✓
Soil Glass Jar - Unpreserved (EG035T)								
BH105A,	BH105C	**26-Sep-2019**	**08-Oct-2019**	24-Oct-2019	✓	**09-Oct-2019**	24-Oct-2019	✓
Soil Glass Jar - Unpreserved (EG035T)								
BH104A,	QA2	**30-Sep-2019**	**08-Oct-2019**	28-Oct-2019	✓	**09-Oct-2019**	28-Oct-2019	✓

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH109A,	BH109C,	**01-Oct-2019**	**08-Oct-2019**	15-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH101A,	BH106A,	**02-Oct-2019**	**08-Oct-2019**	16-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH102A,	BH102C,	**24-Sep-2019**	**05-Oct-2019**	08-Oct-2019	✓	**05-Oct-2019**	14-Nov-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH103A,	BH103C	**25-Sep-2019**	**05-Oct-2019**	09-Oct-2019	✓	**09-Oct-2019**	14-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH105A,	BH105C	**26-Sep-2019**	**08-Oct-2019**	10-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH104A,	QA2	**30-Sep-2019**	**08-Oct-2019**	14-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓

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 Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH109A,	BH109C,	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**10-Oct-2019**	15-Oct-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP080)								
TS1,	TSC1	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**11-Oct-2019**	15-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH109A,	BH109C,	**01-Oct-2019**	**08-Oct-2019**	15-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP080)								
BH101A,	BH106A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**10-Oct-2019**	16-Oct-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B							
Soil Glass Jar - Unpreserved (EP080)								
HA6A,	HA7A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**11-Oct-2019**	16-Oct-2019	✓
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B,	TB1							
Soil Glass Jar - Unpreserved (EP071)								
BH101A,	BH106A,	**02-Oct-2019**	**08-Oct-2019**	16-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EP080)								
BH102A,	BH102C,	**24-Sep-2019**	**05-Oct-2019**	08-Oct-2019	✓	**08-Oct-2019**	08-Oct-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EP071)								
BH103A,	BH103C	**25-Sep-2019**	**05-Oct-2019**	09-Oct-2019	✓	**09-Oct-2019**	14-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP080)								

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 Petroleum Hydrocarbons - Continued								
BH103A,	BH103C	**25-Sep-2019**	**06-Oct-2019**	09-Oct-2019	✓	**08-Oct-2019**	09-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH105A,	BH105C	**26-Sep-2019**	**06-Oct-2019**	10-Oct-2019	✓	**10-Oct-2019**	10-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH105A,	BH105C	**26-Sep-2019**	**08-Oct-2019**	10-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH104A,	QA2	**30-Sep-2019**	**06-Oct-2019**	14-Oct-2019	✓	**10-Oct-2019**	14-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH104A,	QA2	**30-Sep-2019**	**08-Oct-2019**	14-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓

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)								
BH109A,	BH109C,	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**10-Oct-2019**	15-Oct-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP080)								
TS1,	TSC1	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**11-Oct-2019**	15-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH109A,	BH109C,	**01-Oct-2019**	**08-Oct-2019**	15-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP080)								
BH101A,	BH106A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**10-Oct-2019**	16-Oct-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B							
Soil Glass Jar - Unpreserved (EP080)								
HA6A,	HA7A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**11-Oct-2019**	16-Oct-2019	✓
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B,	TB1							
Soil Glass Jar - Unpreserved (EP071)								
BH101A,	BH106A,	**02-Oct-2019**	**08-Oct-2019**	16-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B,							
HA6A,	HA7A,							
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B								
Soil Glass Jar - Unpreserved (EP080)								
BH102A,	BH102C,	**24-Sep-2019**	**05-Oct-2019**	08-Oct-2019	✓	**08-Oct-2019**	08-Oct-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EP071)								
BH103A,	BH103C	**25-Sep-2019**	**05-Oct-2019**	09-Oct-2019	✓	**09-Oct-2019**	14-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP080)								

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 - Continued								
BH103A,	BH103C	**25-Sep-2019**	**06-Oct-2019**	09-Oct-2019	✓	**08-Oct-2019**	09-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH105A,	BH105C	**26-Sep-2019**	**06-Oct-2019**	10-Oct-2019	✓	**10-Oct-2019**	10-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH105A,	BH105C	**26-Sep-2019**	**08-Oct-2019**	10-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH104A,	QA2	**30-Sep-2019**	**06-Oct-2019**	14-Oct-2019	✓	**10-Oct-2019**	14-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP071)								
BH104A,	QA2	**30-Sep-2019**	**08-Oct-2019**	14-Oct-2019	✓	**09-Oct-2019**	17-Nov-2019	✓
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
BH109A,	BH109C,	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**10-Oct-2019**	15-Oct-2019	✓
BH109D,	HA1A							
Soil Glass Jar - Unpreserved (EP080)								
TS1,	TSC1	**01-Oct-2019**	**06-Oct-2019**	15-Oct-2019	✓	**11-Oct-2019**	15-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH101A,	BH106A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**10-Oct-2019**	16-Oct-2019	✓
BH107A,	BH108A,							
HA2A,	HA3A,							
HA3B,	HA4A,							
HA5A,	HA5B							
Soil Glass Jar - Unpreserved (EP080)								
HA6A,	HA7A,	**02-Oct-2019**	**06-Oct-2019**	16-Oct-2019	✓	**11-Oct-2019**	16-Oct-2019	✓
HA8A,	HA8B,							
HA9A,	HA10A,							
HA10B,	HA11A,							
HA11B,	QA1,							
QA2,	SP1A,							
SP1B,	SP2A,							
SP2B,	TB1							
Soil Glass Jar - Unpreserved (EP080)								
BH102A,	BH102C,	**24-Sep-2019**	**05-Oct-2019**	08-Oct-2019	✓	**08-Oct-2019**	08-Oct-2019	✓
QA1								
Soil Glass Jar - Unpreserved (EP080)								
BH103A,	BH103C	**25-Sep-2019**	**06-Oct-2019**	09-Oct-2019	✓	**08-Oct-2019**	09-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH105A,	BH105C	**26-Sep-2019**	**06-Oct-2019**	10-Oct-2019	✓	**10-Oct-2019**	10-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
BH104A,	QA2	**30-Sep-2019**	**06-Oct-2019**	14-Oct-2019	✓	**10-Oct-2019**	14-Oct-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **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	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	7	60	11.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	8	71	11.27	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	5	44	11.36	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	4	60	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	71	5.63	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	44	6.82	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	4	60	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	71	5.63	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	44	6.82	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	4	60	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	71	5.63	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	44	6.82	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)
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.

Preparation Methods	Method	Matrix	Method Descriptions
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.
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.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

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☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT:	RCA Australia	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):
OFFICE:	92 Hill Street, Carrington		
RCA Ref No: 14399		ALS QUOTE NO.:	SYBQ_400_18
PROJECT MANAGER: Fiona Brooker		CONTACT PH: 0408 687 529	
SAMPLER: Zac Laughlan		SAMPLER MOBILE: 0428 288 854	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: administrator@rca.com.au + fionab@rca.com.au +zacharyl@rca.com.au			
Email Invoice to: as above			

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	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	°C		
Other comment:	1.4		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Z. Laughlan			HJ
DATE/TIME: 3/10/19	DATE/TIME: 3/10/19 13:15	DATE/TIME: 3/10/19 17:00	DATE/TIME: 3.10.19 7:30pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | 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 Containers	S26 - TRH(C6-C36/40)/BTEXN/PAH plus 8 metals	Volatile TRH & BTEXN							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH101A	2/10/19	Soil		1	X								
	BH102A	24/9/19			1	X								
	BH102C	24/9/19			1	X								
	BH103A	25/9/19			1	X								
	BH103C	25/9/19			1	X								
	BH104A	30/9/19			1	X								
	BH105A	26/9/19			1	X								
	BH105C	26/9/19			1	X								
	BH106A	2/10/19			1	X								
	BH107A	2/10/19			1	X								
	BH108A	2/10/19			1	X								
	BH109A	1/10/19			1	X								
				TOTAL	12									

Environmental Division Sydney
Work Order Reference
ES1932342

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.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

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

CLIENT:	RCA Australia	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):
OFFICE:	92 Hill Street, Carrington		
RCA Ref No: 14399		ALS QUOTE NO.:	SYBQ_400_18
PROJECT MANAGER: Fiona Brooker		CONTACT PH: 0408 687 529	
SAMPLER: Zac Laughlan		SAMPLER MOBILE: 0428 288 854	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: administrator@rca.com.au + fionab@rca.com.au +zacharyl@rca.com.au			
Email Invoice to: as above			

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 N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment: 1-4

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Z. Laughlan			17 J
DATE/TIME: 3/10/19	DATE/TIME: 3/10/19 13:15	DATE/TIME: 3/10/19 17:00	DATE/TIME: 3.10.19 7:30pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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 Containers	S26 - TRH(C6-C36/40)/BTEXN/PAH plus 8 metals	Volatile TRH & BTEXN							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	BH109 C	1/10/19			1	X								
	BH109 D.	1/10/19			1	X								
	QA1	24/9/19			1	X								
	QA2	30/9/19			1	X								
	HA1a	2/10/19			1	X								
	HA2a				1	X								
	HA3a				1	X								
	HA3b				1	X								
	HA4a				1	X								
	HA5a				1	X								
	HA5b				1	X								
	HA6a				1	X								
				TOTAL	12									

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.

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CLIENT:	RCA Australia	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):
OFFICE:	92 Hill Street, Carrington		
RCA Ref No: 14399		ALS QUOTE NO.:	SYBQ_400_18
PROJECT MANAGER: Fiona Brooker		CONTACT PH: 0408 687 529	
SAMPLER: Zac Laughlan		SAMPLER MOBILE: 0428 288 854	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: administrator@rca.com.au + fionab@rca.com.au +zacharyl@rca.com.au			
Email Invoice to: as above			

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	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	°C		
Other comment:	1-4		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Z. Laughlan			HJ
DATE/TIME: 3/10/19	DATE/TIME: 3/10/19 13:15	DATE/TIME: 3/10/19 17:00	DATE/TIME: 3.10.19 7:30pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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 Containers	S26 - TRH(C5-C36/40)/BTEXN/PAH plus 8 metals	Volatile TRH & BTEXN							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	HA7a				1	X								
	HA8a				1	X								
	HA8b				1	X								
	HA9a				1	X								
	HA10a				1	X								
	HA10b				1	X								
	HA11a				1	X								
	HA11b				1	X								
	QA1				1	X								
	QA2				1	X								
	SP1a				1	X								
	SP1b				1	X								
					TOTAL									

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.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand 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 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd 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: portkembla@alsglobal.com

CLIENT:	**RCA Australia**	**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):
OFFICE:	**92 Hill Street, Carrington**		
RCA Ref No: 14399		**ALS QUOTE NO.:**	**SYBQ_400_18**
PROJECT MANAGER: Fiona Brooker		**CONTACT PH: 0408 687 529**	
SAMPLER: Zac Laughlan		**SAMPLER MOBILE: 0428 288 854**	
COC emailed to ALS? (YES / NO)		**EDD FORMAT (or default):**	
Email Reports to: administrator@rca.com.au + fionab@rca.com.au +zacharyl@rca.com.au			
Email Invoice to: as above			

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	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	°C		
Other comment:	1.4		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Z. Laughlan	[signature]	[signature]	Hg
DATE/TIME: 3/10/19	DATE/TIME: 3/10/19 13:15	DATE/TIME: 3/10/19 17:00	DATE/TIME: 3.10.19 7:30pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	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 Containers	S26 - TRH(C6-C36/40)/BTEXN/PAH plus 8 metals	Volatile TRH & BTEXN							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	SP2a	↓	↓		1	X								
	SP2b	↓	↓		1	X								
	TB1	1/10/19	↓		1		X							
	TS1	1/10/19	↓		1		X							
				TOTAL	4									

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.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1932342**

Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fionab@rca.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4902 9299	Facsimile	: +61-2-8784 8500
Project	: 14399	Page	: 1 of 3
Order number	: ----	Quote number	: ES2017ROBCAR0004 (SYBQ/400/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: ZAC LAUGHLAN		

Dates

Date Samples Received	: 03-Oct-2019 13:16	Issue Date	: 03-Oct-2019
Client Requested Due Date	: 11-Oct-2019	Scheduled Reporting Date	: **11-Oct-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 1.4'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 41 / 41

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.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1932342-001	02-Oct-2019 00:00	BH101A	✓		✓
ES1932342-002	24-Sep-2019 00:00	BH102A	✓		✓
ES1932342-003	24-Sep-2019 00:00	BH102C	✓		✓
ES1932342-004	25-Sep-2019 00:00	BH103A	✓		✓
ES1932342-005	25-Sep-2019 00:00	BH103C	✓		✓
ES1932342-006	30-Sep-2019 00:00	BH104A	✓		✓
ES1932342-007	26-Sep-2019 00:00	BH105A	✓		✓
ES1932342-008	26-Sep-2019 00:00	BH105C	✓		✓
ES1932342-009	02-Oct-2019 00:00	BH106A	✓		✓
ES1932342-010	02-Oct-2019 00:00	BH107A	✓		✓
ES1932342-011	02-Oct-2019 00:00	BH108A	✓		✓
ES1932342-012	01-Oct-2019 00:00	BH109A	✓		✓
ES1932342-013	01-Oct-2019 00:00	BH109C	✓		✓
ES1932342-014	01-Oct-2019 00:00	BH109D	✓		✓
ES1932342-015	24-Sep-2019 00:00	QA1	✓		✓
ES1932342-016	30-Sep-2019 00:00	QA2	✓		✓
ES1932342-017	01-Oct-2019 00:00	HA1A	✓		✓
ES1932342-018	02-Oct-2019 00:00	HA2A	✓		✓
ES1932342-019	02-Oct-2019 00:00	HA3A	✓		✓
ES1932342-020	02-Oct-2019 00:00	HA3B	✓		✓
ES1932342-021	02-Oct-2019 00:00	HA4A	✓		✓
ES1932342-022	02-Oct-2019 00:00	HA5A	✓		✓
ES1932342-023	02-Oct-2019 00:00	HA5B	✓		✓
ES1932342-024	02-Oct-2019 00:00	HA6A	✓		✓
ES1932342-025	02-Oct-2019 00:00	HA7A	✓		✓
ES1932342-026	02-Oct-2019 00:00	HA8A	✓		✓
ES1932342-027	02-Oct-2019 00:00	HA8B	✓		✓
ES1932342-028	02-Oct-2019 00:00	HA9A	✓		✓
ES1932342-029	02-Oct-2019 00:00	HA10A	✓		✓
ES1932342-030	02-Oct-2019 00:00	HA10B	✓		✓
ES1932342-031	02-Oct-2019 00:00	HA11A	✓		✓
ES1932342-032	02-Oct-2019 00:00	HA11B	✓		✓
ES1932342-033	02-Oct-2019 00:00	QA1	✓		✓
ES1932342-034	02-Oct-2019 00:00	QA2	✓		✓
ES1932342-035	02-Oct-2019 00:00	SP1A	✓		✓

			SOIL - EA055-103 Moisture Content	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1932342-036	02-Oct-2019 00:00	SP1B	✓		✓
ES1932342-037	02-Oct-2019 00:00	SP2A	✓		✓
ES1932342-038	02-Oct-2019 00:00	SP2B	✓		✓
ES1932342-039	02-Oct-2019 00:00	TB1		✓	
ES1932342-040	01-Oct-2019 00:00	TS1		✓	
ES1932342-041	01-Oct-2019 00:00	TSC1		✓	

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- *AU Certificate of Analysis - NATA (COA)	Email	administrator@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	administrator@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	administrator@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	administrator@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
- Chain of Custody (CoC) (COC)	Email	administrator@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	administrator@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	administrator@rca.com.au

FIONA BROOKER

- *AU Certificate of Analysis - NATA (COA)	Email	fionab@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	fionab@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	fionab@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	fionab@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	fionab@rca.com.au
- Chain of Custody (CoC) (COC)	Email	fionab@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	fionab@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	fionab@rca.com.au

ZAC LAUGHLAN

- *AU Certificate of Analysis - NATA (COA)	Email	zacharyl@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	zacharyl@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	zacharyl@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	zacharyl@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	zacharyl@rca.com.au
- Chain of Custody (CoC) (COC)	Email	zacharyl@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	zacharyl@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	zacharyl@rca.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1933349**	Page	: 1 of 13
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 11-Oct-2019 14:38
Order number	: ----	Date Analysis Commenced	: 14-Oct-2019
C-O-C number	: ----	Issue Date	: 17-Oct-2019 16:29
Sampler	: BYRON GARNER		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 17		
No. of samples analysed	: 17		

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*
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Rassem Ayoubi	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 sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP101	TP102	TP103	TP104	TP105
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-001	ES1933349-002	ES1933349-003	ES1933349-004	ES1933349-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	16.3	12.4	13.0	11.7	15.4
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	5	<5	5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	4	3	5	4	2
Copper	7440-50-8	5	mg/kg	13	9	10	14	19
Lead	7439-92-1	5	mg/kg	30	16	17	19	54
Nickel	7440-02-0	2	mg/kg	2	<2	2	<2	<2
Zinc	7440-66-6	5	mg/kg	157	30	28	24	36
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP101	TP102	TP103	TP104	TP105
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-001	ES1933349-002	ES1933349-003	ES1933349-004	ES1933349-005
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**84.6**	**82.9**	**84.8**	**84.2**	**89.2**
2-Chlorophenol-D4	93951-73-6	0.5	%	**94.2**	**91.8**	**94.5**	**93.5**	**98.2**
2.4.6-Tribromophenol	118-79-6	0.5	%	**86.4**	**74.2**	**92.4**	**84.3**	**93.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**109**	**107**	**108**	**107**	**113**
Anthracene-d10	1719-06-8	0.5	%	**95.7**	**90.0**	**95.1**	**95.4**	**97.8**
4-Terphenyl-d14	1718-51-0	0.5	%	**106**	**104**	**104**	**106**	**111**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**107**	**101**	**119**	**115**	**110**
Toluene-D8	2037-26-5	0.2	%	**95.0**	**93.2**	**102**	**89.0**	**102**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP101	TP102	TP103	TP104	TP105
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-001	ES1933349-002	ES1933349-003	ES1933349-004	ES1933349-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**83.6**	**83.7**	**97.4**	**90.6**	**83.6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP106	TP107	TP108	TP109	RP101
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-006	ES1933349-007	ES1933349-008	ES1933349-009	ES1933349-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	18.3	21.0	15.5	13.0	4.5
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	10	<5	6
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	3	3	8	4	17
Copper	7440-50-8	5	mg/kg	15	12	<5	15	11
Lead	7439-92-1	5	mg/kg	28	16	8	23	9
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	3	10
Zinc	7440-66-6	5	mg/kg	25	20	8	46	54
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP106	TP107	TP108	TP109	RP101
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-006	ES1933349-007	ES1933349-008	ES1933349-009	ES1933349-010
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	82.5	82.5	80.4	85.7	85.8
2-Chlorophenol-D4	93951-73-6	0.5	%	91.2	91.5	91.3	96.4	95.4
2.4.6-Tribromophenol	118-79-6	0.5	%	81.1	78.9	60.7	75.1	58.0
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	104	105	105	112	113
Anthracene-d10	1719-06-8	0.5	%	91.9	91.4	94.2	96.6	98.8
4-Terphenyl-d14	1718-51-0	0.5	%	104	109	109	115	113
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	100	123	94.8	111	111
Toluene-D8	2037-26-5	0.2	%	87.9	85.1	96.1	93.0	101

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP106	TP107	TP108	TP109	RP101
			Client sampling date / time	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	08-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-006	ES1933349-007	ES1933349-008	ES1933349-009	ES1933349-010
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	74.9	80.3	88.6	86.2	85.7

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RP102	RP103	RP108	RP109	TB2
			Client sampling date / time	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-011	ES1933349-012	ES1933349-013	ES1933349-014	ES1933349-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	10.8	10.0	5.2	3.8	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	10	<5	10	9	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	12	22	14	15	----
Copper	7440-50-8	5	mg/kg	15	9	16	16	----
Lead	7439-92-1	5	mg/kg	9	16	9	8	----
Nickel	7440-02-0	2	mg/kg	22	6	23	28	----
Zinc	7440-66-6	5	mg/kg	52	64	67	103	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.3	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	1.2	<0.5	<0.5	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	0.5	<0.5	<0.5	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	0.8	<0.5	<0.5	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	0.7	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	4.5	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	0.8	<0.5	<0.5	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	1.1	0.6	0.6	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.4	1.2	1.2	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RP102	RP103	RP108	RP109	TB2
			Client sampling date / time	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-011	ES1933349-012	ES1933349-013	ES1933349-014	ES1933349-015
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	81.9	83.3	90.5	78.3	----
2-Chlorophenol-D4	93951-73-6	0.5	%	91.4	92.4	99.8	86.9	----
2.4.6-Tribromophenol	118-79-6	0.5	%	41.5	56.8	52.0	46.7	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	108	110	117	104	----
Anthracene-d10	1719-06-8	0.5	%	93.3	96.2	99.4	90.7	----
4-Terphenyl-d14	1718-51-0	0.5	%	111	108	120	112	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	114	103	116	114	118
Toluene-D8	2037-26-5	0.2	%	96.3	86.1	97.2	102	89.9

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RP102	RP103	RP108	RP109	TB2
			Client sampling date / time	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00	09-Oct-2019 00:00
Compound	CAS Number	LOR	Unit	ES1933349-011	ES1933349-012	ES1933349-013	ES1933349-014	ES1933349-015
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**89.1**	**74.0**	**88.9**	**87.8**	**82.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TS2	TSC2	----	----	----
			Client sampling date / time	02-Oct-2019 00:00	02-Oct-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1933349-016	ES1933349-017	--------	--------	--------
				Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	57	82	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	72	102	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	40	59	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	12.2	16.6	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	2.4	3.2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	12.2	16.2	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	5.2	6.9	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	32.0	42.9	----	----	----
^ Total Xylenes	----	0.5	mg/kg	17.4	23.1	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	91.7	91.5	----	----	----
Toluene-D8	2037-26-5	0.2	%	103	100	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	102	100.0	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) 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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1933349**	Page	: 1 of 9
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 11-Oct-2019
Order number	: ----	Date Analysis Commenced	: 14-Oct-2019
C-O-C number	: ----	Issue Date	: 17-Oct-2019
Sampler	: BYRON GARNER		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 17		
No. of samples analysed	: 17		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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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.

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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 (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2638407)									
ES1933144-001	Anonymous	EG005T: Copper	7440-50-8	5	mg/kg	21	17	21.4	No Limit
ES1933144-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	9	29.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	13	10	24.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	78	54	37.0	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	53	38	32.8	0% - 50%
ES1933348-008	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	8	7	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	9.78	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	10	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	11	11	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	46	45	0.00	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2638408)									
ES1933414-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	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	58	57	0.00	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	6	7	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	23	20	13.8	No Limit
ES1933349-006	TP106	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2638408) - continued									
ES1933349-006	TP106	EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	15	14	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	28	32	11.9	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	25	25	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2638410)									
ES1933250-005	Anonymous	EA055: Moisture Content	----	0.1	%	17.6	17.5	0.00	0% - 50%
ES1933348-010	Anonymous	EA055: Moisture Content	----	0.1	%	6.8	5.7	18.4	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2638411)									
ES1933349-008	TP108	EA055: Moisture Content	----	0.1	%	15.5	15.7	1.08	0% - 50%
ES1933414-005	Anonymous	EA055: Moisture Content	----	0.1	%	9.1	9.6	4.96	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2638406)									
ES1933144-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1933348-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2638409)									
ES1933349-006	TP106	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2637856)									
ES1933348-008	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
ES1933349-009	TP109	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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2637856) - continued									
ES1933349-009	TP109	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: 2637434)									
ES1933324-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1933349-008	TP108	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2637855)									
ES1933348-008	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
ES1933349-009	TP109	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: 2637434)									
ES1933324-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1933349-008	TP108	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: 2637855)									
ES1933348-008	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
ES1933349-009	TP109	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: 2637434)									
ES1933324-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	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 (%)*
EP080: BTEXN (QC Lot: 2637434) - continued									
ES1933324-001	Anonymous	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
ES1933349-008	TP108	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

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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2638407)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	99.6	86.0	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	103	83.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	97.9	76.0	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	106	86.0	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	104	80.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	107	87.0	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	109	80.0	122
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2638408)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	91.9	86.0	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.4	83.0	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	93.4	76.0	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	94.1	86.0	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	101	80.0	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	101	87.0	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	101	80.0	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2638406)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	80.1	70.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2638409)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	75.2	70.0	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2637856)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	117	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	110	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	101	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	104	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	117	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	102	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	122	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	118	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	97.0	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	102	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	95.2	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	97.8	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	105	70.0	126

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: 2637856) - continued								
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	85.7	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	73.3	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	88.3	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2637434)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	74.4	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2637855)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	89.0	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	91.7	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	89.8	71.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2637434)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	70.9	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2637855)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	90.4	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	90.1	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	93.0	63.0	131
EP080: BTEXN (QCLot: 2637434)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	86.5	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	86.6	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	66.6	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	76.4	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	76.3	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	75.5	63.0	119

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
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2638407)							
ES1933144-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	93.5	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.7	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	107	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	102	70.0	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2638407) - continued							
ES1933144-001	Anonymous	EG005T: Zinc	7440-66-6	250 mg/kg	102	70.0	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2638408)							
ES1933349-006	TP106	EG005T: Arsenic	7440-38-2	50 mg/kg	97.0	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	100	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70.0	130
		EG005T: Copper	7440-50-8	250 mg/kg	99.3	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.1	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	103	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2638406)							
ES1933144-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	82.3	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2638409)							
ES1933349-006	TP106	EG035T: Mercury	7439-97-6	5 mg/kg	86.8	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2637856)							
ES1933348-008	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	100	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	106	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2637434)							
ES1933324-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	78.5	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2637855)							
ES1933348-008	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	112	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	121	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	121	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2637434)							
ES1933324-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	73.5	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2637855)							
ES1933348-008	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	105	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	124	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	117	52.0	132
EP080: BTEXN (QCLot: 2637434)							
ES1933324-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	87.4	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	92.3	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.3	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	82.7	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	81.8	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	90.7	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1933349**	Page	: 1 of 6
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 11-Oct-2019
Site	: ----	Issue Date	: 17-Oct-2019
Sampler	: BYRON GARNER	No. of samples received	: 17
Order number	: ----	No. of samples analysed	: 17

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **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) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**----**	----	----	**14-Oct-2019**	22-Oct-2019	✓
Soil Glass Jar - Unpreserved (EA055) RP101, RP102, RP103, RP108, RP109	**09-Oct-2019**	**----**	----	----	**14-Oct-2019**	23-Oct-2019	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**14-Oct-2019**	05-Apr-2020	✓	**15-Oct-2019**	05-Apr-2020	✓
Soil Glass Jar - Unpreserved (EG005T) RP101, RP102, RP103, RP108, RP109	**09-Oct-2019**	**14-Oct-2019**	06-Apr-2020	✓	**15-Oct-2019**	06-Apr-2020	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**14-Oct-2019**	05-Nov-2019	✓	**15-Oct-2019**	05-Nov-2019	✓
Soil Glass Jar - Unpreserved (EG035T) RP101, RP102, RP103, RP108, RP109	**09-Oct-2019**	**14-Oct-2019**	06-Nov-2019	✓	**15-Oct-2019**	06-Nov-2019	✓

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**14-Oct-2019**	22-Oct-2019	✓	**16-Oct-2019**	23-Nov-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) RP101, RP102, RP103, RP108, RP109	**09-Oct-2019**	**14-Oct-2019**	23-Oct-2019	✓	**16-Oct-2019**	23-Nov-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) TS2, TSC2	**02-Oct-2019**	**14-Oct-2019**	16-Oct-2019	✓	**16-Oct-2019**	16-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**14-Oct-2019**	22-Oct-2019	✓	**16-Oct-2019**	22-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080) RP101, RP102, RP103, RP108, RP109, TB2	**09-Oct-2019**	**14-Oct-2019**	23-Oct-2019	✓	**16-Oct-2019**	23-Oct-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) TS2, TSC2	**02-Oct-2019**	**14-Oct-2019**	16-Oct-2019	✓	**16-Oct-2019**	16-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP101, TP102, TP103, TP104, TP105, TP106, TP107, TP108, TP109	**08-Oct-2019**	**14-Oct-2019**	22-Oct-2019	✓	**16-Oct-2019**	22-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080) RP101, RP102, RP103, RP108, RP109, TB2	**09-Oct-2019**	**14-Oct-2019**	23-Oct-2019	✓	**16-Oct-2019**	23-Oct-2019	✓

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: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
TS2,	TSC2	**02-Oct-2019**	**14-Oct-2019**	16-Oct-2019	✓	**16-Oct-2019**	16-Oct-2019	✓
Soil Glass Jar - Unpreserved (EP080)								
TP101,	TP102,	**08-Oct-2019**	**14-Oct-2019**	22-Oct-2019	✓	**16-Oct-2019**	22-Oct-2019	✓
TP103,	TP104,							
TP105,	TP106,							
TP107,	TP108,							
TP109								
Soil Glass Jar - Unpreserved (EP080)								
RP101,	RP102,	**09-Oct-2019**	**14-Oct-2019**	23-Oct-2019	✓	**16-Oct-2019**	23-Oct-2019	✓
RP103,	RP108,							
RP109,	TB2							

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	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	40	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	10.00	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	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
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)
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.

Preparation Methods	Method	Matrix	Method Descriptions
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.
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.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand 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 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Rd 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: portkembla@alsglobal.com

CLIENT:	RCA Australia	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):
OFFICE:	92 Hill Street, Carrington		
RCA Ref No: 14399		ALS QUOTE NO.:	SYBQ_400_18
PROJECT MANAGER: Fiona Brooker		CONTACT PH: 0408 687 529	
SAMPLER: Byron Garner		SAMPLER MOBILE: 0401 481 735	
COC emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to: administrator@rca.com.au + fionab@rca.com.au + zacharyl@rca.com.au			
Email Invoice to: as above			

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	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt	0.9 °C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
M. Belk (RCA)	KM	KM	HJ
DATE/TIME: 11/10/19, 2.35 p.m.	DATE/TIME: 11/10/19 14:40	DATE/TIME: 11/10/19 17:00	DATE/TIME: 7:45 pm 11.10.19

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | 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 Containers	S26 - TRH(C6-C36/40)/BTEXN/PAH plus 8 metals	Volatile TRH & BTEXN							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	TP101	8/10/19	Soil		1	X								
2	TP102		Soil		1	X								
3	TP103		Soil		1	X								
4	TP104		Soil		1	X								
5	TP105		Soil		1	X								
6	TP106		Soil		1	X								
7	TP107		Soil		1	X								
8	TP108		Soil		1	X								
9	TP109		Soil		1	X								
10	RP101	9/10/19	Soil		1	X								
11	RP102		Soil		1	X								
12	RP103		Soil		1	X								
13	RP108		Soil		1	X								
14	RP109		Soil		1	X								
15	TB2	9/10/19	Soil		1		X							
16	TS2	8/10/19	Soil		1		X							
				TOTAL	16									

NEWCASTLE LAB OF ORIGIN

Environmental Divisic
Sydney
Work Order Reference
ES1933349

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.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1933349**

Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fionab@rca.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4902 9299	Facsimile	: +61-2-8784 8500
Project	: 14399	Page	: 1 of 3
Order number	: ----	Quote number	: ES2017ROBCAR0004 (SYBQ/400/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BYRON GARNER		

Dates

Date Samples Received	: 11-Oct-2019 14:38	Issue Date	: 11-Oct-2019
Client Requested Due Date	: 17-Oct-2019	Scheduled Reporting Date	: **17-Oct-2019**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 0.9'c - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1933349-001	08-Oct-2019 00:00	TP101	✓		✓
ES1933349-002	08-Oct-2019 00:00	TP102	✓		✓
ES1933349-003	08-Oct-2019 00:00	TP103	✓		✓
ES1933349-004	08-Oct-2019 00:00	TP104	✓		✓
ES1933349-005	08-Oct-2019 00:00	TP105	✓		✓
ES1933349-006	08-Oct-2019 00:00	TP106	✓		✓
ES1933349-007	08-Oct-2019 00:00	TP107	✓		✓
ES1933349-008	08-Oct-2019 00:00	TP108	✓		✓
ES1933349-009	08-Oct-2019 00:00	TP109	✓		✓
ES1933349-010	09-Oct-2019 00:00	RP101	✓		✓
ES1933349-011	09-Oct-2019 00:00	RP102	✓		✓
ES1933349-012	09-Oct-2019 00:00	RP103	✓		✓
ES1933349-013	09-Oct-2019 00:00	RP108	✓		✓
ES1933349-014	09-Oct-2019 00:00	RP109	✓		✓
ES1933349-015	09-Oct-2019 00:00	TB2		✓	
ES1933349-016	02-Oct-2019 00:00	TS2		✓	
ES1933349-017	02-Oct-2019 00:00	TSC2		✓	

Proactive Holding Time Report

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

Requested Deliverables

ALL INVOICES

- *AU Certificate of Analysis - NATA (COA)	Email	administrator@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	administrator@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	administrator@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	administrator@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
- Chain of Custody (CoC) (COC)	Email	administrator@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	administrator@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	administrator@rca.com.au

FIONA BROOKER

- *AU Certificate of Analysis - NATA (COA)	Email	fionab@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	fionab@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	fionab@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	fionab@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	fionab@rca.com.au
- Chain of Custody (CoC) (COC)	Email	fionab@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	fionab@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	fionab@rca.com.au

ZAC LAUGHLAN

- *AU Certificate of Analysis - NATA (COA)	Email	zacharyl@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	zacharyl@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	zacharyl@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	zacharyl@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	zacharyl@rca.com.au
- Chain of Custody (CoC) (COC)	Email	zacharyl@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	zacharyl@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	zacharyl@rca.com.au

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CERTIFICATE OF ANALYSIS 228288

Client Details

Client	RCA Australia
Attention	Fiona Brooker, Zac Laughlan
Address	PO Box 175, Carrington, NSW, 2294

Sample Details

Your Reference	**14399**
Number of Samples	1 Soil
Date samples received	14/10/2019
Date completed instructions received	14/10/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	21/10/2019
Date of Issue	17/10/2019

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Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	15/10/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	76

svTRH (C10-C40) in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	16/10/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	90

PAHs in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	15/10/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	0.3
Anthracene	mg/kg	0.1
Fluoranthene	mg/kg	1.4
Pyrene	mg/kg	1.3
Benzo(a)anthracene	mg/kg	0.9
Chrysene	mg/kg	0.6
Benzo(b,j+k)fluoranthene	mg/kg	1
Benzo(a)pyrene	mg/kg	1.0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	0.7
Total +ve PAH's	mg/kg	8.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.3
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.4
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.4
Surrogate p-Terphenyl-d14	%	104

Acid Extractable metals in soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date prepared	-	15/10/2019
Date analysed	-	15/10/2019
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	26
Copper	mg/kg	10
Lead	mg/kg	11
Mercury	mg/kg	<0.1
Nickel	mg/kg	6
Zinc	mg/kg	47

Moisture		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date prepared	-	15/10/2019
Date analysed	-	16/10/2019
Moisture	%	5.6

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	83	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	91	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	87	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	79	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	[NT]	[NT]	[NT]	[NT]	88	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate o-Terphenyl	%		Org-003	88	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	121	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	110	[NT]	[NT]	[NT]	[NT]	104	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	102	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

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CERTIFICATE OF ANALYSIS 228288

Client Details

Client	RCA Australia
Attention	Fiona Brooker, Zac Laughlan
Address	PO Box 175, Carrington, NSW, 2294

Sample Details

Your Reference	**14399**
Number of Samples	1 Soil
Date samples received	14/10/2019
Date completed instructions received	14/10/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	21/10/2019
Date of Issue	17/10/2019

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Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	15/10/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	76

svTRH (C10-C40) in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	16/10/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	90

PAHs in Soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date extracted	-	15/10/2019
Date analysed	-	15/10/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	0.3
Anthracene	mg/kg	0.1
Fluoranthene	mg/kg	1.4
Pyrene	mg/kg	1.3
Benzo(a)anthracene	mg/kg	0.9
Chrysene	mg/kg	0.6
Benzo(b,j+k)fluoranthene	mg/kg	1
Benzo(a)pyrene	mg/kg	1.0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	0.7
Total +ve PAH's	mg/kg	8.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.3
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.4
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.4
Surrogate p-Terphenyl-d14	%	104

Acid Extractable metals in soil		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date prepared	-	15/10/2019
Date analysed	-	15/10/2019
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	26
Copper	mg/kg	10
Lead	mg/kg	11
Mercury	mg/kg	<0.1
Nickel	mg/kg	6
Zinc	mg/kg	47

Moisture		
Our Reference		228288-1
Your Reference	UNITS	QA5
Depth		0.1
Date Sampled		09/10/2019
Type of sample		Soil
Date prepared	-	15/10/2019
Date analysed	-	16/10/2019
Moisture	%	5.6

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	83	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	91	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	87	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	79	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	[NT]	[NT]	[NT]	[NT]	88	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate o-Terphenyl	%		Org-003	88	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	121	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	110	[NT]	[NT]	[NT]	[NT]	104	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Date analysed	-			15/10/2019	[NT]	[NT]	[NT]	[NT]	15/10/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	102	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP

ENVIROLAB GROUP

Client: RCA Australia	Client Project Name / Number / Site etc (ie report title): 14399	**Envirolab Services** 12 Ashley St, Chatswood, NSW 2067 Phone: 02 9910 6200 Fax :02 9910 6201 E-mail: ahie@envirolabservices.com.au Contact: Aileen Hie
Contact person: Zac Laughlan	PO No.:	
Project Mgr: Fiona Brooker	Envirolab Quote No. :	
Sampler: Zac Laughlan	Date results required:	
Address: 92 Hill St Carrington 2294	Or choose: *Note: Inform lab in advance if urgent turnaround is required - surcharge applies*	**Envirolab Services WA t/a MPL** 16-18 Hayden Crt, Myaree WA 6154 Phone: 08 9317 2505 Fax :08 9317 4163 E-mail: lab@mpl.com.au Contact: Joshua Lim
Phone: 02 4902 9200 Mob: 0428 288 854	Lab comments:	
Fax:		
Email: administrator@rca.com.au + fionab@rca.com.au + zacharyl@rca.com.au		

Sample information					Tests Required													Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Combination 3 - TRH, BTEX, PAH, 8 metals													Provide as much information about the sample as you can
1	QA5	0.1	9/10/2019	Soil	X													

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 228288
Date Received: 14/10/19
Time Received: 1605
Received by: SB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company): RCA	Received by (company): ELS Syd	*Lab use only:*
Print Name: Zac Laughlan	Print Name: S. Bolton	Samples Received: Cool or Ambient (circle one)
Date & Time: 11/10/2019	Date & Time: 14/10/19 1605	Temperature Received at: 21.7 (if applicable)
Signature:	Signature:	Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

Page No:

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1933987**	Page	: 1 of 5
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019 19:30
Order number	: ----	Date Analysis Commenced	: 22-Oct-2019
C-O-C number	: ----	Issue Date	: 24-Oct-2019 13:02
Sampler	: Zac Laughlan		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) 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: SOIL (Matrix: SOIL)			Client sample ID	BH108A	----	----	----	----
			Client sampling date / time	02-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1933987-001	--------	--------	--------	--------
				Result	----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	**8.9**	----	----	----	----
After HCl pH	----	0.1	pH Unit	**5.5**	----	----	----	----
Extraction Fluid Number	----	1	-	**2**	----	----	----	----
Final pH	----	0.1	pH Unit	**5.7**	----	----	----	----

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)			Client sample ID	BH108A	----	----	----	----
			Client sampling date / time	02-Oct-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1933987-001	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**27.5**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**66.4**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**65.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**83.0**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%	**95.4**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	**76.3**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **TCLP LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1933987**	Page	: 1 of 3
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019
Order number	: ----	Date Analysis Commenced	: 22-Oct-2019
C-O-C number	: ----	Issue Date	: 24-Oct-2019
Sampler	: Zac Laughlan		
Site	: ----		
Quote number	: SYBQ/400/18		
No. of samples received	: 1		
No. of samples analysed	: 1		

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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

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
EN33: TCLP Leach (QCLot: 2655318)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	<0.1	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2658032)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.9	50.0	94.0
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	82.2	63.6	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	71.6	62.2	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.8	63.9	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	82.9	62.6	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	88.8	64.3	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	93.2	63.6	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	92.9	63.1	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	82.2	64.1	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	78.3	62.5	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	70.6	61.7	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	93.2	63.0	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	88.7	63.3	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	89.4	59.9	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	84.1	61.2	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	86.4	59.1	118

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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1933987**	Page	: 1 of 4
Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Telephone	: +61-2-8784 8555
Project	: 14399	Date Samples Received	: 03-Oct-2019
Site	: ----	Issue Date	: 24-Oct-2019
Sampler	: Zac Laughlan	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EN33: TCLP Leach						
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
BH108A	22-Oct-2019	16-Oct-2019	**6**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	2	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	2	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: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EN33: TCLP Leach							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)							
BH108A	**02-Oct-2019**	**22-Oct-2019**	16-Oct-2019	×	**----**	----	----

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH108A	**22-Oct-2019**	**23-Oct-2019**	29-Oct-2019	✓	**23-Oct-2019**	02-Dec-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **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*	
Method Blanks (MB)							
TCLP for Non & Semivolatile Analytes	EN33a	1	11	**9.09**	**9.09**	✓	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)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	2	**0.00**	**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
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	SOIL	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)

Preparation Methods	Method	Matrix	Method Descriptions
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

S148-149
#11

Fadi Soro

Fmj: 17/10/19 9:30

From: Fiona Brooker <fionab@rca.com.au>
Sent: Thursday, 17 October 2019 9:10 AM
To: Samples Sydney
Cc: Loren Schiavon
Subject: [EXTERNAL] - ES1932342 - additional testing

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Good morning

1

Can you please undertake TCLP and PAH testing of leachate on sample BH108A from ES192342?

Thanks and regards

Environmental Division
Sydney
Work Order Reference
ES1933987

Telephone : +61-2-8784 8555

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Celebrating 25 Years in 2019!

Fiona Brooker
Environmental Services Manager

t: 02 4902 9225 | f: 02 4902 9299 | m: 0408 687 529
e: fionab@rca.com.au | w: www.rca.com.au
a: PO Box 175 / 92 Hill Street, Carrington NSW 2294

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ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1933987**

Client	: **ROBERT CARR & ASSOCIATES P/L**	Laboratory	: Environmental Division Sydney
Contact	: MS FIONA BROOKER	Contact	: Customer Services ES
Address	: P O BOX 175 CARRINGTON NSW, AUSTRALIA 2294	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: fionab@rca.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 02 4902 9200	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 4902 9299	Facsimile	: +61-2-8784 8500
Project	: 14399	Page	: 1 of 3
Order number	: ----	Quote number	: ES2017ROBCAR0004 (SYBQ/400/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Zac Laughlan		

Dates

Date Samples Received	: 03-Oct-2019 19:30	Issue Date	: 18-Oct-2019
Client Requested Due Date	: 24-Oct-2019	Scheduled Reporting Date	: **24-Oct-2019**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.1
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This is a rebatch of ES1932342.**
- **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.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EN33a TCLP Leachate	SOIL - EP075 SIM PAH only SIM - PAH only
ES1933987-001	02-Oct-2019 00:00	BH108A	✓	✓

Proactive Holding Time Report

The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / **Client Sample ID(s)**	**Container**	**Due for extraction**	**Due for analysis**	**Samples Received**		**Instructions Received**	
				Date	**Evaluation**	**Date**	**Evaluation**
EN33a: TCLP for Non & Semivolatile Analytes							
BH108A	Non-Volatile Leach: 14 day HT(ε	16-Oct-2019	----	03-Oct-2019	✓	17-Oct-2019	×

Requested Deliverables

ALL INVOICES

- *AU Certificate of Analysis - NATA (COA)	Email	administrator@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	administrator@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	administrator@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	administrator@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	administrator@rca.com.au
- Chain of Custody (CoC) (COC)	Email	administrator@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	administrator@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	administrator@rca.com.au

FIONA BROOKER

- *AU Certificate of Analysis - NATA (COA)	Email	fionab@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	fionab@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	fionab@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	fionab@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	fionab@rca.com.au
- Chain of Custody (CoC) (COC)	Email	fionab@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	fionab@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	fionab@rca.com.au

ZAC LAUGHLAN

- *AU Certificate of Analysis - NATA (COA)	Email	zacharyl@rca.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	zacharyl@rca.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	zacharyl@rca.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	zacharyl@rca.com.au
- A4 - AU Tax Invoice (INV)	Email	zacharyl@rca.com.au
- Chain of Custody (CoC) (COC)	Email	zacharyl@rca.com.au
- EDI Format - ENMRG (ENMRG)	Email	zacharyl@rca.com.au
- EDI Format - ESDAT (ESDAT)	Email	zacharyl@rca.com.au

Appendix D

Bore, Hand Auger & Test Pit Logs

TEST PIT LOG
TP101

RCA AUSTRALIA
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PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2012
SURFACE RL: 86.60 m AHD
COORDS: 378220.60 m E 6356718.60 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered	5		D-TP101 0.10m	86.5	0.10		SW	TOPSOIL, Silty SAND, fine to coarse grained, dark brown, with fine sub-rounded gravel	M		TOPSOIL
	5		0.20m				CL	Sandy CLAY, low plasticity, grey mottled orange-brown, fine to medium grained sand, trace of fine angular gravel (relict sandstone)	w~PL	H	RESIDUAL
	4		B								
	4		0.40m					Sandstone band from 0.4m to 0.45m			
	10				0.5						
	10			86.0							
	20				0.70			SANDSTONE, fine grained, grey	DW	L	BEDROCK
					0.85			TEST PIT TP101 TERMINATED AT 0.85 m Bucket refusal			
					1.0						
				85.5							
					1.5						
				85.0							
					2.0						
				84.5							

LOGGED: BG | CHECKED: MA | DATE: 28/10/2019

RCA_LIB_08.1_RCA_STANDARD.GLB Log RCA TEST PIT LOG 14399_TEST_PITS.GPJ <<DrawingFile>> 01/11/2019 11:27 Produced by gINT Professional, Developed by Datgel

TEST PIT LOG
TP102

RCA AUSTRALIA
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PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 68.10 m AHD
COORDS: 378057.10 m E 6356573.70 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered	1		D-TP102 0.10m	68.0	0.10		SM	TOPSOIL, Silty SAND, fine grained, brown	M		TOPSOIL
	2						SM	Silty SAND, fine to medium grained, pale brown, low plasticity silt, trace of fine to medium sub-rounded gravel		L	SLOPEWASH
	1		0.30m								
	2		B 0.40m								
	2				0.5					MD	
	3			67.5							
	4										
	4										
	8										
	11				1.0						
	12			67.0							
	8				1.20		CL	Sandy CLAY, low plasticity, orange and grey, fine to medium grained sand, trace of fine sub-rounded gravel	w>LL	VSt	RESIDUAL
	11										
	12	PP350kPa									
	11				1.5						
	11			66.5							
	15				1.70		CH	CLAY, high plasticity, grey mottled orange-brown	w>PL		
	15	PP350kPa									
					2.0						
				66.0							
								TEST PIT TP102 TERMINATED AT 2.20 m Limit of investigation			

LOGGED: BG | CHECKED: MA | DATE: 28/10/2019

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TEST PIT LOG
TP103

SHEET 1 OF 1

RCA AUSTRALIA
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PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 63.80 m AHD
COORDS: 377873.60 m E 6356697.00 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered	11	PP340 - 390kPa	D-TP103 0.10m		0.10		SM	TOPSOIL, Silty SAND, fine to medium grained, brown, with fine to medium sub-angular gravel	D		TOPSOIL
	8		0.20m				CH	CLAY, high plasticity, pale grey	w>PL	VSt	RESIDUAL
	5		B	63.5							
	3		0.40m								
	4				0.5						
	4										
	4										
	7										
	10			63.0	0.80			Carbonaceous SILTSTONE, brown, Interbedded with SILTSTONE, grey	DW	VL - L	BEDROCK
	15										
	20				1.00			TEST PIT TP103 TERMINATED AT 1.00 m Bucket refusal			
				62.5							
					1.5						
				62.0							
					2.0						
				61.5							

LOGGED: BG | CHECKED: MA | DATE: 28/10/2019

RCA_LIB_08.1_RCA_STANDARD.GLB Log RCA TEST PIT LOG 14399_TEST_PITS.GPJ <<DrawingFile>> 01/11/2019 11:27 Produced by gINT Professional, Developed by Datgel

TEST PIT LOG
TP104

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 58.40 m AHD
COORDS: 377961.70 m E 6356866.80 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			D-TP104 0.10m				SM	TOPSOIL, Silty SAND, fine grained, brown, low plasticity silt	D		TOPSOIL
	5										
	10										
					0.30						
	8		0.40m	58.0			CH	CLAY, high plasticity, grey mottled orange-brown, with fine to medium grained sand	w~PL	H	RESIDUAL
	4		B 0.50m								
					0.5						
	5										
					0.60						
	5							SANDSTONE, medium grained, grey stained orange	DW	M	BEDROCK
					0.70						
	6							TEST PIT TP104 TERMINATED AT 0.70 m Bucket refusal			
	20										
				57.5							
					1.0						
				57.0							
					1.5						
				56.5							
					2.0						
				56.0							

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TEST PIT LOG
TP105

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 69.15 m AHD
COORDS: 377824.00 m E 6356897.20 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			TP105 0.10m				SM	TOPSOIL, Silty SAND, fine grained, brown	M		TOPSOIL
	3			69.0							
	2				0.20		CH	CLAY, high plasticity, grey	w>PL	St - VSt	RESIDUAL
	2										
	3				0.40		CH	CLAY, high plasticity, grey stained orange	MW	VH	Extremely Weathered Siltstone Structure
	3	PP200kPa			0.5						
			0.60m		0.60		CL	Sandy CLAY, low plasticity, grey stained orange	XW	VL	
	3			68.5							
	9		B								
	15		0.90m		0.90			SHALE, grey	MW	L	BEDROCK
	12				1.0						
	20										
				68.0							
					1.40			TEST PIT TP105 TERMINATED AT 1.40 m Bucket refusal			
					1.5						
				67.5							
					2.0						
				67.0							

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TEST PIT LOG
TP106

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 68.85 m AHD
COORDS: 377684.10 m E 6356947.10 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			D-TP106 0.10m				ML	TOPSOIL, Sandy SILT, low plasticity, brown	M		TOPSOIL
	5		0.20m		0.20		CH	CLAY, high plasticity, pale brown mottled grey and orange, trace of fine to medium grained sand	w>PL	St	RESIDUAL
	1										
	2	PP140 - 160kPa	B	68.5							
	2		0.50m		0.5						
	1										
	2									VSt	
	2										
	2	PP300 - 340kPa		68.0				As above, grey			
	2				1.0						
	3										
	3				1.20			SILTSTONE, grey	SW	M - H	BEDROCK
	8										
	20			67.5					XW - HW	VL - L	Dipping across hole
					1.5						
								TEST PIT TP106 TERMINATED AT 1.60 m Bucket refusal			
				67.0							
					2.0						
				66.5							

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TEST PIT LOG
TP107

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 76.95 m AHD
COORDS: 377507.80 m E 6356999.90 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered			D-TP107 0.10m				ML	TOPSOIL, Sandy SILT, medium plasticity, brown, fine grained sand	w>PL		TOPSOIL
	3										
	2										
	3		0.40m		0.40						
	3		B	76.5	0.5		CH	CLAY, high plasticity, grey mottled orange-brown, with fine to medium grained sand	w>PL	St - VSt	RESIDUAL
	4	PP200kPa	0.60m								
	4										
	4										
	8										
	20			76.0	1.0					VSt	
		PP240 - 30kPa									Extremely Weathered Siltstone structure from 1.1m
				75.5	1.50			SILTSTONE/SHALE, grey	SW	M - H	BEDROCK
								TEST PIT TP107 TERMINATED AT 1.60 m Bucket refusal			
				75.0	2.0						
				74.5							

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TEST PIT LOG
TP108

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 70.70 m AHD
COORDS: 377507.30 m E 6356859.70 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered	8		D-TP108 0.10m		0.05		ML	TOPSOIL, Sandy SILT, low plasticity, brown, fine grained sand	D		TOPSOIL
	11			70.5			CH	CLAY, high plasticity, mottled grey and brown-orange	w>PL	VSt - H	RESIDUAL
	6	PP400 - 410kPa	0.30m								
	3										
	3		B		0.5						
	3	PP550 - 600kPa	0.60m							H	
	4			70.0							
	5										
	4										
	10				0.90			Sandy SILTSTONE, grey stained orange	HW	VL - L	BEDROCK
	25				1.0						
					1.10			TEST PIT TP108 TERMINATED AT 1.10 m Bucket refusal			
				69.5							
					1.5						
				69.0							
					2.0						
				68.5							

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TEST PIT LOG
TP109

SHEET 1 OF 1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE: 08/10/2019
SURFACE RL: 68.45 m AHD
COORDS: 377499.30 m E 6356687.80 m N MGA94 56
EXCAVATION METHOD: 3.5t Ex. with 350mm Toothed Bucket

Test Pit Information						Field Material Information					
WATER	DYNAMIC PENETROMETER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
Not Encountered	7		D-TP109 0.10m				ML	TOPSOIL, Sandy SILT, low plasticity, brown, fine grained sand	w<PL		TOPSOIL
	14										
	14										
	5		0.40m		0.40						
	3	PP400 - 600kPa		68.0			CH	CLAY, high plasticity, dark grey-brown, with fine to medium angular gravel (siltstone and charcoal), trace of fine to coarse grained sand	w>PL	VSt / H	COLLUVIUM
	2		B		0.5						
	4		0.70m		0.60		CH	COAL, high plasticity, pale grey, trace of fine to medium angular gravel 9relict siltstone)	w>PL	VSt / H	RESIDUAL
	10	PP480 - 550kPa									
	12										
	13			67.5	1.0						
	25				1.10			SILTSTONE, dark grey	SW	M	BEDROCK Fossiferous
					1.20			Carbonaceous CLAYSTONE/COAL, dark brown/black	XW - HW	VL - L	
				67.0	1.5						
				66.5	2.00			Tuffaceous CLAYSTONE, grey	MW	L	
				66.0				TEST PIT TP109 TERMINATED AT 2.10 m Limit of investigation			

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BOREHOLE LOG
BH101

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 03/10/2019
DATE COMPLETED: 03/10/2019
SURFACE RL: 70.95 m AHD
COORDS: 377909.90 m E 6356635.80 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		BH101a 0.10m		0.10		CI	TOPSOIL, Silty CLAY, medium plasticity, brown			TOPSOIL
							CI-CH	CLAY, medium to high plasticity, grey mottled orange, trace of fine ironstone gravel	w>PL	VSt	RESIDUAL
		0.50m	0.50m	70.5	0.5			Becoming pale grey mottled orange at 0.5m			
		PP330 - 390kPa	BH101b 0.70m								
		SPT 3, 3, 4 N=7	D								
		0.95m	0.95m	70.0	1.0					VSt - H	
					1.30		CH	Tuffaceous CLAY, high plasticity, pale grey, with very low strength siltstone layers	w<PL	H	
		1.50m	1.50m	69.5	1.5						
		PP>600kPa									
		SPT 8, 17, 23 N=40	D								
					1.80		CH	Tuffaceous CLAY, high plasticity, pale grey, with very low to low strength siltstone layers (Extremely Weathered Tuffaceous Siltstone)			EXTREMELY WEATHERED MATERIAL
		1.95m	1.95m	69.0	2.0						
				68.5	2.5						
					2.70			Tuffaceous SANDSTONE, fine grained, pale grey	HW	VL	BEDROCK
		3.00m	3.00m	68.0	3.0						
		PP>600kPa									
		SPT 13, 20/80mm N=R	D 3.23m					REMAINDER OF BORE SEPARATELY			
		3.23m						CONTINUED AS CORED BOREHOLE			
				67.5	3.5						
				67.0	4.0						
				66.5	4.5						
				66.0							

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BOREHOLE LOG
BH102

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 23/09/2019
DATE COMPLETED: 24/09/2019
SURFACE RL: 73.85 m AHD
COORDS: 377892.80 m E 6356624.60 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		D-BH102a QA1 0.10m				SM	FILL, Silty SAND, fine to medium grained, brown, trace of rootlets	M		FILL
					0.20		SM	FILL, Silty SAND, fine to medium grained, brown, trace of clay			
		0.50m	0.50m	73.5	0.5						
		PP250 - 390kPa	D-BH102b (0.7-0.75m)								
		SPT 2, 7, 9 N=16	0.75m		0.70		CI-CH	CLAY, high plasticity, brown mottled orange	w~PL	H	RESIDUAL
		PP>600kPa 0.95m	D 0.95m	73.0				Becoming dark grey mottled orange, with sand at 0.8m	w<PL		
					1.0						
				72.5							
		1.45m	1.45m D		1.40			SILTSTONE, pale grey and orange		VL	BEDROCK
		1.53m SPT 22/80mm HB N=R			1.5			REMAINDER OF BORE SEPARATELY CONTINUED AS CORED BOREHOLE			
				72.0	2.0						
				71.5	2.5						
				71.0	3.0						
				70.5	3.5						
				70.0	4.0						
				69.5	4.5						
				69.0							

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BOREHOLE LOG
BH103

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 25/09/2019
DATE COMPLETED: 26/09/2019
SURFACE RL: 79.15 m AHD
COORDS: 377885.10 m E 6356597.70 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		D-BH103a 0.10m		0.10			TOPSOIL, Silty SAND, fine to medium grained, brown	M		TOPSOIL
			D 0.20m	79.0			SM	Silty SAND, fine to medium grained, orange-brown			SLOPEWASH
			D-BH103b 0.40m		0.40						
		0.50m	D-BH103c 0.50m		0.5			SANDSTONE, fine to medium grained, pale grey and orange	MW - HW	VL	BEDROCK
		SPT 10/110mm HB N=R 0.61m	D 0.61m	78.5						L	
				78.0	1.0						
					1.5						
				77.5					MW	M	
					2.0						
				77.0				REMAINDER OF BORE SEPARATELY			
	0% LOSS							CONTINUED AS CORED BOREHOLE			
					2.5						
				76.5							
					3.0						
				76.0							
					3.5						
				75.5							
					4.0						
				75.0							
					4.5						
				74.5							

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BOREHOLE LOG
BH104

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 30/09/2019
DATE COMPLETED: 30/09/2019
SURFACE RL: 68.70 m AHD
COORDS: 377855.30 m E 6356674.30 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		D-BH104a QA2 0.10m	68.5				Silty SAND, fine to medium grained, brown, trace of fine to medium gravel	M		SLOPEWASH
			0.30m		0.30						
			D-BH104b					CLAY, high plasticity, pale grey mottled orange	w>PL	St - VSt	RESIDUAL
		0.50m	0.50m		0.5						
		PP340 - 400kPa									
		SPT 2, 3, 5 N=8	D	68.0						VSt - H	
		0.95m	0.95m		1.0						
				67.5							
					1.40						
		1.50m	1.50m		1.5			Tuffaceous SILTSTONE, pale grey with iron staining	HW	VL	BEDROCK
		SPT 10, 29, 30/110mm HB N=R	D	67.0							
		1.91m	1.91m					REMAINDER OF BORE SEPARATELY			
					2.0			CONTINUED AS CORED BOREHOLE			
				66.5							
					2.5						
				66.0							
					3.0						
				65.5							
					3.5						
				65.0							
					4.0						
				64.5							
					4.5						
				64.0							

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BOREHOLE LOG
BH105

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 26/09/2019
DATE COMPLETED: 26/09/2019
SURFACE RL: 72.75 m AHD
COORDS: 377835.70 m E 6356654.30 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		D-BH105a 0.10m				SM	FILL, Gravelly Silty SAND, fine to medium grained, brown, fine to medium gravel, trace of organics	M		FILL
				72.5							
		0.50m	0.50m		0.5			Becoming with a trace of clay at 0.5m			
		PP150 - 250kPa	D-BH105b 0.70m							VSt - H	
		SPT 2, 2, 4 N=6	D-BH105c 0.90m	72.0	0.70		CI-CH	CLAY, medium to high plasticity, pale grey mottled orange	w>PL		RESIDUAL
		0.95m	D 0.95m		1.0						
					1.10		CH	Tuffaceous CLAY, high plasticity, grey and orange		VSt	
				71.5							
		1.50m	1.50m		1.5						
		PP290 - 320kPa									
		SPT 3, 4, 8 N=12	D	71.0							
		1.95m	1.95m		2.0						
				70.5							
					2.5						
				70.0							
		3.00m	3.00m		3.0			Becoming high plasticity, pale grey			
		PP550 - >600kPa									
		SPT 4, 11, 13 N=24	D	69.5					w~PL	H	
		3.45m	3.45m		3.40						
					3.5		CI-CH	CLAY, medium to high plasticity, brown, with carbonaceous lenses	w<PL		
				69.0							
					4.0						
				68.5							
					4.30		CH	Extremely Weathered Tuffaceous Siltstone, properties of Tuffaceous CLAY, high plasticity, pale grey, with low strength tuffaceous siltstone layers			EXTREMELY WEATHERED MATERIAL
		4.50m	4.50m		4.5						
		SPT 13, 19, 26 N=45	D	68.0							
		4.95m	4.95m								

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BOREHOLE LOG
BH105

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 26/09/2019
DATE COMPLETED: 26/09/2019
SURFACE RL: 72.75 m AHD
COORDS: 377835.70 m E 6356654.30 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)	6.00m SPT 30/150mm HB N=R 6.15m	6.00m D 6.15m	67.5 67.0	5.5 6.0		CH	Extremely Weathered Tuffaceous Siltstone, properties of Tuffaceous CLAY, high plasticity, pale grey, with low strength tuffaceous siltstone layers REMAINDER OF BORE SEPARATELY	w<PL	H	EXTREMELY WEATHERED MATERIAL
				66.5 66.0 65.5 65.0 64.5 64.0 63.5 63.0	6.5 7.0 7.5 8.0 8.5 9.0 9.5			CONTINUED AS CORED BOREHOLE			

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BOREHOLE LOG
BH106

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 04/10/2019
DATE COMPLETED: 04/10/2019
SURFACE RL: 76.60 m AHD
COORDS: 377830.00 m E 6356632.70 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		BH106a 0.10m	76.5			SM	FILL, Gravelly silty SAND, fine to medium grained, grey-brown, fine to medium gravel	D		FILL
			0.30m								
			BH106b								
		0.50m	0.50m		0.5						
		PP>600kPa SPT 6, 7, 3/10mm N=R 0.81m	D 0.81m	76.0	0.60		CI	Sandy CLAY, medium plasticity, grey mottled orange, with fine to medium sub-rounded gravel REMAINDER OF BORE SEPARATELY	w<PL	H	RESIDUAL
								CONTINUED AS CORED BOREHOLE			
				75.5	1.0						
				75.0	1.5						
				74.5	2.0						
				74.0	2.5						
				73.5	3.0						
				73.0	3.5						
				72.5	4.0						
				72.0	4.5						

LOGGED: RC/TH | CHECKED: MA | DATE: 28/10/2019

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BOREHOLE LOG
BH107

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 10/10/2019
DATE COMPLETED: 11/10/2019
SURFACE RL: 71.40 m AHD
COORDS: 377791.50 m E 6356701.00 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		0.10m BH107a 0.15m		0.10			FILL, MULCH/WOODCHIPS, dark brown	M		FILL
							CI-CH	FILL, Sandy Silty CLAY, medium to high plasticity, grey and pale brown, trace of fine to medium rounded to sub-rounded gravel	w>PL		
		0.50m PP250 - 280kPa SPT 3, 4, 3 N=7	0.50m D	71.0	0.50		CI-CH	Silty CLAY, medium to high plasticity, pale grey with pale brown and red mottles, trace to with some fine to coarse grained sand		VSt	RESIDUAL
		0.95m	0.95m	70.5	1.0						
		1.50m PP>450kPa SPT 6, 11, 13 N=24	1.50m BH107b	70.0	1.5					H	
		1.95m	1.95m	69.5	2.0			Becoming with relict rock sandstone at 1.9m			
				69.0	2.50			Extremely Weathered Silty Sandstone, fine to medium grained, pale grey with orange-brown mottles, weathered to low to medium plasticity Sandy Silty CLAY	w<PL EW	EL - H	EXTREMELY WEATHERED MATERIAL
		3.00m SPT 10, 18, 15/70mm HB N=R	3.00m D	68.5	3.0			REMAINDER OF BORE SEPARATELY			
				68.0	3.5			CONTINUED AS CORED BOREHOLE			
				67.5	4.0						
				67.0	4.5						
				66.5							

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BOREHOLE LOG
BH108

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 09/10/2019
DATE COMPLETED: 09/10/2019
SURFACE RL: 71.40 m AHD
COORDS: 377792.30 m E 6356683.20 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		BH108a QA3 0.10m					FILL, Silty sandy GRAVEL, fine to medium, grey, sub-angular to angular, fine to coarse grained sand	D - M		FILL
					0.20			FILL, Silty Clayey SAND, brown	M		
					0.30			FILL, Clayey Silty SAND, fine to coarse grained, yellow-brown, with fine gravel			
		0.50m	0.50m	71.0	0.5						
		SPT 5, 7, 4 N=11	D								
		0.95m	0.95m	70.5	1.0			Becoming increased drilling resistance at 1.0m			
					1.20		CI	Sandy CLAY, medium plasticity, grey mottled pale brown	w>PL	St	RESIDUAL
		1.50m	1.50m	70.0	1.5						
		PP130 - 150kPa									
		SPT 1, 2, 4 N=6	BH108b								
		1.95m	1.95m	69.5	2.0			Becoming with red mottles at ~1.8m			
				69.0	2.50			Silty CLAY, medium to high plasticity, pale grey (Extremely Weathered Material derived from claystone with relict rock structure)	w<PL	H	EXTREMELY WEATHERED MATERIAL
		3.00m	3.00m	68.5	3.0						
		PP>450kPa									
		SPT 6, 12, 13 N=25	D								
		3.45m	3.45m	68.0	3.5						
				67.5	4.00		CI-CH	SANDSTONE, fine to medium grained, orange	HW	VL	BEDROCK
		4.50m	4.50m	67.0	4.5			REMAINDER OF BORE SEPARATELY			
		4.57m SPT 15/65mm HB N=R	D	66.5				CONTINUED AS CORED BOREHOLE			

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BOREHOLE LOG
BH109

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 01/10/2019
DATE COMPLETED: 01/10/2019
SURFACE RL: 76.03 m AHD
COORDS: 377782.40 m E 6356650.90 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		BH109a 0.10m	76.0			SM	FILL, Silty SAND, fine to medium grained, brown, with organics	M		FILL
			0.40m BH109b 0.50m								
		0.50m		75.5	0.5						
		SPT 3, 4, 3 N=7	D								
		0.95m	0.95m								
				75.0	1.0						
					1.10		CI	FILL, Gravelly Sandy CLAY, medium plasticity, grey, fine to medium sub-rounded gravel, trace of coal fragments	w>PL		
		1.50m	1.50m								
		PP100 - 190kPa	BH109c 1.70m	74.5	1.5						
		SPT 2, 4, 2 N=6	D								
		1.95m	1.95m								
				74.0	2.0						
					2.40		CH	Tuffaceous CLAY, high plasticity, pale grey	w>PL	St - VSt	RESIDUAL
				73.5	2.5						
		3.00m	3.00m								
		PP210 - 240kPa	BH109d 3.20m	73.0	3.0						
		SPT 11, 13, 16 N=29	D		3.20		CH	CLAY, high plasticity, grey, highly weathered, very low to low siltstone layers	w~PL	H	
		3.45m	3.45m								
				72.5	3.5						
				72.0	4.0						
		4.50m	4.50m								
		PP450 - 550kPa		71.5	4.5						
		SPT 15, 17, 14 N=31	D								
		4.95m	4.95m								

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BOREHOLE LOG
BH109

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 01/10/2019
DATE COMPLETED: 01/10/2019
SURFACE RL: 76.03 m AHD
COORDS: 377782.40 m E 6356650.90 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)			71.0			CH	CLAY, high plasticity, grey, highly weathered, very low to low siltstone layers	w~PL	H	
					5.30		MH	Clayey SILT, high plasticity, black (weathered coal)	w<PL	H	
				70.5	5.5						
		6.00m	6.00m	70.0	6.0						
		SPT 5, 11, 17 N=28	D								
		6.45m	6.45m	69.5	6.5						
		7.00m	7.00m		7.00						
		SPT 17, 40/150mm N=R	D 7.15m	69.0				COAL, black	MW	L	BEDROCK
			D 7.30m		7.15			Laminated SILTSTONE, grey and dark grey REMAINDER OF BORE SEPARATELY			
		7.30m						CONTINUED AS CORED BOREHOLE			
				68.5	7.5						
				68.0	8.0						
				67.5	8.5						
				67.0	9.0						
				66.5	9.5						

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BOREHOLE LOG
BH110

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: John Hunter Health and Innovation Precinct
LOCATION: John Hunter Hospital

DATE COMMENCED: 14/10/2019
DATE COMPLETED: 15/10/2019
SURFACE RL: 77.95 m AHD
COORDS: 377858.70 m E 6356614.50 m N MGA94 56
DRILL MODEL: Hanjin D&B 8d

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	DESCRIPTION (SOIL NAME;plasticity/grain size, particle shape, colour, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	(Not Encountered during augering)		0.20m BH110a 0.30m					FILL/TOPSOIL, Gravelly Silty SAND, fine to medium grained, dark brown, fine to medium sub-rounded gravel, comprising red sandstone rock fragments REMAINDER OF BORE SEPARATELY	M		FILL / TOPSOIL
				77.5	0.5			CONTINUED AS CORED BOREHOLE			
				77.0	1.0						
				76.5	1.5						
				76.0	2.0						
				75.5	2.5						
				75.0	3.0						
				74.5	3.5						
				74.0	4.0						
				73.5	4.5						
				73.0							

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ENVIRONMENTAL HAND AUGER
HA1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 75.00 m AHD
COORDS: 377787.40 m E 6356655.70 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA1a 0.10m				FILL, Silty SAND, fine to medium grained, brown, with rootlets and timber		D		FILL No odour
			74.5	0.5						
				0.60		FILL, Gravelly Sandy CLAY, grey/dark brown, sub-rounded gravel, trace of rootlets		M		No odour
			74.0	1.0		Orange/red mottling at 1.0m				
		1.50m HA1b 1.60m	73.5	1.5						
						HAND AUGER HA1 TERMINATED AT 1.60 m Due to refusal				

LOGGED: ZL | CHECKED: FB | DATE: 28/10/2019

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ENVIRONMENTAL HAND AUGER
HA2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 71.75 m AHD
COORDS: 377787.90 m E 6356702.20 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		0.05m		0.05		FILL/TOPSOIL, Silty SAND, black, with timber		D		FILL / TOPSOIL No odour
		HA2a 0.15m				FILL, Gravelly Sandy CLAY, grey, with organic material, timber and rootlets		M		FILL No odour
			71.5							
		0.30m HA2b 0.40m								
						HAND AUGER HA2 TERMINATED AT 0.40 m Due to refusal				
				0.5						
			71.0							
				1.0						
			70.5							
				1.5						
			70.0							

LOGGED: ZL | CHECKED: FB | DATE: 28/10/2019

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ENVIRONMENTAL HAND AUGER
HA3

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 66.98 m AHD
COORDS: 377820.80 m E 6356686.00 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA3a 0.10m				Clayey SAND, fine to medium grained, dark grey, with organic material, rootlets		D		NATURAL No odour
			66.5	0.5		Becoming pale grey at 0.5m				
				0.80		Sandy CLAY, pale grey with orange mottling, trace of rootlets		M		NATURAL No odour
		1.00m HA3b 1.10m	66.0	1.0						
				1.10		HAND AUGER HA3 TERMINATED AT 1.10 m Due to refusal				
			65.5	1.5						
			65.0							

LOGGED: ZL | CHECKED: FB | DATE: 28/10/2019

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ENVIRONMENTAL HAND AUGER
HA4

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 67.20 m AHD
COORDS: 377832.00 m E 6356686.50 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA4a 0.10m	67.0	0.5		Clayey SAND, fine to medium grained, pale grey, trace of rootlets		D		NATURAL No odour
			66.5	0.70		Sandy CLAY, pale grey with red/orange mottling		M		No odour
		1.00m HA4b 1.10m		1.0						
				1.10		HAND AUGER HA4 TERMINATED AT 1.10 m Due to refusal				
			66.0	1.5						
			65.5							

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ENVIRONMENTAL HAND AUGER
HA5

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 69.80 m AHD
COORDS: 377823.70 m E 6356673.00 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA5a 0.10m				TOPSOIL, Silty SAND, black, with organic material		M		TOPSOIL No odour
				0.10		Sandy CLAY, grey with orange mottling, trace of sub-rounded gravel and rootlets		M		NATURAL No odour
			69.5	0.30		CLAY, pale grey with red/orange mottling		M		No odour
				0.5						
		0.60m HA5b QA1 0.70m								
				0.70		HAND AUGER HA5 TERMINATED AT 0.70 m Due to refusal				
			69.0							
				1.0						
			68.5							
				1.5						
			68.0							

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ENVIRONMENTAL HAND AUGER
HA6

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 73.50 m AHD
COORDS: 377803.40 m E 6356655.20 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA6a 0.10m				FILL, Gravelly Silty SAND, brown, with organic material		D		FILL No odour
		0.30m HA6b 0.40m								
			73.0	0.5		HAND AUGER HA6 TERMINATED AT 0.40 m Due to refusal				
			72.5	1.0						
			72.0	1.5						

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ENVIRONMENTAL HAND AUGER
HA7

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 75.25 m AHD
COORDS: 377823.50 m E 6356643.80 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA7a 0.10m	75.0			FILL, Gravelly Sandy CLAY, dark grey with orange mottling, with rootlets		D		FILL No odour
		0.40m HA7b 0.50m		0.5		HAND AUGER HA7 TERMINATED AT 0.50 m Due to refusal				
			74.5							
				1.0						
			74.0							
				1.5						
			73.5							

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RCA_LIB_08.1_RCA_STANDARD.GLB Log RCA HAND AUGER LOG 14399-HAND_AUGERS.GPJ <<DrawingFile>> 01/11/2019 11:29 Produced by gINT Professional, Developed by Datgel

ENVIRONMENTAL HAND AUGER
HA8

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 70.70 m AHD
COORDS: 377849.90 m E 6356663.30 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA8a 0.10m	70.5	0.40		Silty SAND, pale brown, trace of sub-angular gravel, with rootlets		D		NATURAL No odour
				0.5		Sandy CLAY, pale brown, trace of gravel		M		No odour
		0.70m HA8b 0.80m	70.0	0.60		CLAY, grey with red/orange mottling		M		No odour
				0.80		HAND AUGER HA8 TERMINATED AT 0.80 m Due to refusal				
			69.5	1.0						
			69.0	1.5						

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ENVIRONMENTAL HAND AUGER
HA9

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 72.10 m AHD
COORDS: 377860.10 m E 6356649.00 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA9a 0.10m	72.0			Silty SAND, dark grey, with rootlets		D		NATURAL No odour
				0.30		Sandy CLAY, pale grey, trace of rootlets		M		No odour
				0.50		CLAY, brown, red/orange mottling, trace of rootlets		M		No odour
			71.5							
		0.80m HA8b 0.90m								
				0.90		HAND AUGER HA9 TERMINATED AT 0.90 m Due to refusal				
				1.0						
			71.0							
				1.5						
			70.5							

LOGGED: ZL | CHECKED: FB | DATE: 28/10/2019

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ENVIRONMENTAL HAND AUGER
HA10

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 70.80 m AHD
COORDS: 377873.20 m E 6356654.00 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA10a QA2 0.10m	70.5	0.40		Sandy CLAY, grey, trace of gravel and rootlets		D		NATURAL No odour
		0.60m HA10b 0.70m		0.5		CLAY, pale brown, red/orange mottling		M		No odour
				0.70		HAND AUGER HA10 TERMINATED AT 0.70 m Due to refusal				
			70.0	1.0						
			69.5	1.5						
			69.0							

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ENVIRONMENTAL HAND AUGER
HA11

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL: 77.75 m AHD
COORDS: 377875.50 m E 6356610.30 m N MGA94 56
EXCAVATION METHOD:

Borehole Information					Field Material Information					
WATER	FIELD TEST	SAMPLE	RL (m AHD)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppmv)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		HA10a 0.10m 0.20m HA10b 0.30m	77.5			FILL, Gravelly Silty SAND, fine to medium grained, grey		D		FILL No odour
				0.5		HAND AUGER HA11 TERMINATED AT 0.30 m Due to refusal				
			77.0							
				1.0						
			76.5							
				1.5						
			76.0							

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ENVIRONMENTAL HAND AUGER
SP1

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL:
COORDS:
EXCAVATION METHOD:

Borehole Information				Field Material Information					
WATER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppm)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		0.10m SP1a 0.20m	0.20		FILL, Silty Sandy CLAY, black, with sub-angular gravel and rootlets		M		FILL No odour
		0.90m SP1b 1.00m	0.5 1.00		FILL, Sandy CLAY, dark grey with orange mottling, with rootlets		M		No odour
		1.20m SP1c 1.30m	1.30		CLAY, grey with orange mottling		M		NATURAL No odour
			1.5		HAND AUGER SP1 TERMINATED AT 1.30 m				

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ENVIRONMENTAL HAND AUGER
SP2

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

PROJECT No: 14399
CLIENT: Health Infrastructure
PROJECT: Geotechnical and Contamination Investigation
LOCATION: John Hunter Health and Innovation Precinct

DATE: 02/10/2019
SURFACE RL:
COORDS:
EXCAVATION METHOD:

Borehole Information				Field Material Information					
WATER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppm)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	STRUCTURE/AESTHETICS AND ADDITIONAL OBSERVATIONS
Not Encountered		0.30m SP2a 0.40m	0.5		FILL, Sandy CLAY, dark grey, trace of gravel Becoming paler grey with orange mottling at 0.5m		M		FILL No odour
		0.90m SP2b 1.00m	0.80 1.0		Sandy CLAY, yellow, red/orange mottling		M		NATURAL No odour
			1.20 1.5		HAND AUGER SP2 TERMINATED AT 1.20 m				

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Appendix E

Photographs

PHOTOGRAPH 1 *South eastern corner of Development site looking north east over the location of BH109 and HA1.*

PHOTOGRAPH 2 *Location of BH108, located to the eastern side entrance road to Development site.*

PHOTOGRAPH 3 *Example fill material located along the southern boundary of the Development site and approximate location of HA11.*

PHOTOGRAPH 4 *Approximate location of TP104 located near 'stockpile' material.*

PHOTOGRAPH 5 *Approximate location of TP103 and example road pavement material sampled location RP103.*

PHOTOGRAPH 6 *Material removed from TP103 and confirmation of encountered bedrock material depth.*

PHOTOGRAPH 7 *View of example 'stockpile' material and location of sample SP2.*

PHOTOGRAPH 8 *Location of sample SP1.*

PHOTOGRAPH 9 *Example material removed from sample location SP1 within 'stockpile'.*

PHOTOGRAPH 10 *Example material removed from sample location HA4 along northern boundary of Development site.*

Appendix F

Summary of Results

Sample Identification	PQL	Guideline [A]										BH101A	BH102A	BH102C	BH103A	BH103C	BH104A	BH105A	BH105C	BH106A	BH107A	BH108A	BH109A
Sample Depth (m) [B]		HSL 'D'					ESL C&I		Non-sensitive ML		DC D	0.1	0.1	0.85	0.1	0.4	0.1	0.1	0.7	0.1	0.1	0.1	0.1
Date		SAND 0-<1m	SILT 0-<1m	CLAY 0-<1m	CLAY 1-<2m	CLAY 2-<4m	Coarse	Fine	Coarse	Fine		3/10/19	24/9/19	24/9/19	25/9/19	25/9/19	30/9/19	26/9/19	26/9/19	2/10/19	2/10/19	2/10/19	1/10/19
Sample Profile												TOPSOIL, Silty CLAY, medium plasticity, brown	FILL, Silty SAND, fine-medium grained, brown, with trace rootlets	CLAY, high plasticity, brown, with orange mottling	TOPSOIL, Silty SAND, fine-medium grained, brown	SLOPEWASH, Silt SAND, fine-medium grained, orange-brown	SLOPEWASH, Silty SAND, fine-medium grained, brown, trace of fine-medium grade gravel	FILL, Gravelly Silty SAND, fine-medium grained, brown, with fine-medium gravel, trace organics	CLAY, medium-hard plasticity, pale grey, with orange mottling	FILL, Gravelly Silty SAND, fing-medium grained, grey/brown, fine to medium grained gravel	FILL, sandy-silty CLAY, medium to high palsticity, grey & pale brown, trace of fine to medium gravel.	FILL, silty sandy GRAVEL, fine to medium subangular, grey, fine to medium grained sand	FILL, Silty SAND, fine to medium grained, brown, with organics
Dominant Stratum [C]												CLAY	SAND	CLAY	SAND	SAND	SAND	SAND	CLAY	SAND	CLAY	SAND	SAND
Sample Purpose												Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by												RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																							
Benzene	0.2	3	4	4	6	9	75	95			430	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	NL	NL	NL	NL	NL	135	135			99000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	NL	NL	NL	NL	NL	165	185			27000	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- and para-Xylene	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
ortho-Xylene	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
Total Xylenes	1	230	NL	NL	NL	NL	180	95			81000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polycyclic Aromatic Hydrocarbons (PAH)																							
Naphthalene	1	NL	NL	NL	NL	NL	370	370			11000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons (TRH)																							
TRH C_6-C_{10}	10								700	800	26000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH >C_{10}-C_{16}	50						170	170	1000	1000	20000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	100						1700	2500	3500	5000	27000	<100	<100	<100	<100	<100	<100	<100	130	260	380	190	150
TRH >C_{34}-C_{40}	100						3300	6600	10000	10000	38000	<100	<100	<100	<100	<100	<100	<100	<100	550	550	170	160
F1	10	260	250	310	480	NL	215	215				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2	50	NL	NL	NL	NL	NL						<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

All results are in units of mg/kg.

Blank Cell indicates no criterion available

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

F1 = TRH C_6-C_{10} minus BTEX. F1 PQL deemed equal TRH C_6-C_{10}.

F2 = TRH>C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >C_{10}-C_{16}.

[A] ASC NEPM 1999 (amended April 2013) Vapour Based Health Screening Levels (HSL) 'D' (Commercial/Industrial)

[A] ASC NEPM 1999 (amended April 2013) Ecological Screening Levels (ESL) C&I (Commercial and Industrial)

[A] ASC NEPM 1999 (amended April 2013) Management Limits (ML) Non-Sensitive Sites (Commercial and Industrial)

[A] CRC Care Technical Report 10, September 2011 Direct Contact (DC) Health Screening Levels 'D' (Commercial/Industrial)

[B] Start of sample, generally over a 0.1m interval

[C] Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used

NL designates 'Not Limiting' indicating that the pore water concentration required to constitute a vapour risk is higher than the solubility capacity for that compound based on a petroleum mixture. Vapour is therefore not a risk for this compound.

Results for TRH have been compared to TPH guidelines.

Presented ESL for naphthalene is an Ecological Investigation Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

ESL for TRH >C_{16}-C_{34} and >C_{34}-C_{40} are low reliability

Results shown in **BOLD** are in excess of the vapour based HSL

Results shown in shading are >250% of the vapour based HSL

Results shown in underline are in excess of the ESL

Results shown in *italics* are in excess of the management limit

Results shown in patterned cells are in excess of the direct contact HSL

Where summation required (Xylene, F1, F2) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	PQL	Guideline [A]										BH109C	BH109D	HA1A	HA2A	HA3A	HA3B	HA4A	HA5A	HA5B	HA6A	HA7A	HA8A
Sample Depth (m) [B]		HSL 'D'					ESL C&I		Non-sensitive ML		DC D	1.5	3	0.1	0.05	0.1	1	0.1	0.1	0.6	0.1	0.1	0.1
Date		SAND 0-<1m	SILT 0-<1m	CLAY 0-<1m	CLAY 1-<2m	CLAY 2-<4m	Coarse	Fine	Coarse	Fine		1/10/19	1/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19
Sample Profile												FILL, Gravelly, Sandy CLAY, medium plasticity, grey, fine-medium sub-rounded gravel, trace coal fragments	Tuffaceous CLAY, high plasticity, pale grey	FILL, Silty SAND, fine to medium grained, brown, with rootlets and timber	FILL, gravelly sandy CLAY, grey, with organic material, timber and rootlets	Clayey SAND, fine to medium grained, dark grey, with organic material, rootlets	Sandy CLAY, pale grey with orange mottling, trace of rootlets	Clayey SAND, fine to medium grained, pale grey, trace rootlets	TOPSOIL, Silty SAND, black, with organic material	CLAY, pale grey with red/orange mottling	FILL, Gravelly Silty SAND, brown, with organic material	FILL, Gravelly Sandy CLAY, dark grey with orange mottling, with rootlets	Silt SAND, pale brown, trace of sub-angular gravel, with rootlets
Dominant Stratum [C]												CLAY	CLAY	SAND	CLAY	SAND	CLAY	SAND	SAND	CLAY	SAND	CLAY	SAND
Sample Purpose												Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by												RCA - RC	RCA - RC	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																							
Benzene	0.2	3	4	4	6	9	75	95			430	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	NL	NL	NL	NL	NL	135	135			99000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	NL	NL	NL	NL	NL	165	185			27000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- and para-Xylene	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
ortho-Xylene	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
Total Xylenes	1	230	NL	NL	NL	NL	180	95			81000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polycyclic Aromatic Hydrocarbons (PAH)																							
Naphthalene	1	NL	NL	NL	NL	NL	370	370			11000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons (TRH)																							
TRH C_6-C_{10}	10								700	800	26000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH >C_{10}-C_{16}	50						170	170	1000	1000	20000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	100						1700	2500	3500	5000	27000	180	<100	110	270	<100	<100	<100	<100	<100	200	<100	<100
TRH >C_{34}-C_{40}	100						3300	6600	10000	10000	38000	<100	<100	<100	240	<100	<100	<100	<100	<100	310	<100	<100
F1	10	260	250	310	480	NL	215	215				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2	50	NL	NL	NL	NL	NL						<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

All results are in units of mg/kg.
Blank Cell indicates no criterion available
PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laborat
F1 = TRH C_6-C_{10} minus BTEX. F1 PQL deemed equal TRH C_6-C_{10}.
F2 = TRH>C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >C_{10}-C_{16}.
[A] ASC NEPM 1999 (amended April 2013) Vapour Based Health Screening Levels (HSL) 'D' (Commercial/Industrial)
[A] ASC NEPM 1999 (amended April 2013) Ecological Screening Levels (ESL) C&I (Commercial and Industrial)
[A] ASC NEPM 1999 (amended April 2013) Management Limits (ML) Non-Sensitive Sites (Commercial and Industrial)
[A] CRC Care Technical Report 10, September 2011 Direct Contact (DC) Health Screening Levels 'D' (Commercial/Industrial)
[B] Start of sample, generally over a 0.1m interval
[C] Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used
NL designates 'Not Limiting' indicating that the pore water concentration required to constitute a vapour risk is higher than the solubility capacity for that compound based on a petroleum mixture. Vapour is therefore not a risk for this compound.
Results for TRH have been compared to TPH guidelines.
Presented ESL for naphthalene is an Ecological Investigation Level
ESL are applicable for material at less than 2m depths below finished surface/ground level
For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero
ESL for TRH >C_{16}-C_{34} and >C_{34}-C_{40} are low reliability
Results shown in **BOLD** are in excess of the vapour based HSL
Results shown in shading are >250% of the vapour based HSL
Results shown in underline are in excess of the ESL
Results shown in *italics* are in excess of the management limit
Results shown in patterned cells are in excess of the direct contact HSL
Where summation required (Xylene, F1, F2) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	PQL	Guideline [A]										HA8B	HA9A	HA10A	HA10B	HA11A	HA11B	SP1A	SP1B	SP2A	SP2B	TP101	TP102	TP103
Sample Depth (m) [B]		HSL 'D'					ESL C&I		Non-sensitive ML		DC D	0.7	0.1	0.1	0.6	0.1	0.3	0.1	0.9	0.3	0.9	0.1	0.1	0.1
Date		SAND 0-<1m	SILT 0-<1m	CLAY 0-<1m	CLAY 1-<2m	CLAY 2-<4m	Coarse	Fine	Coarse	Fine		2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	8/10/19	8/10/19	8/10/19
Sample Profile												CLAY, grey with red/orange mottling	Silty SAND, dark grey, with rootlets	Sandy CLAY, grey, trace of gravel and rootlets	CLAY, pale brown, re/prange mottling	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Silty Sandy CLAY, black, with subangular gravel and rootlets	FILL, Sandy CLAY, dark grey with orange mottling, with rootlets	FILL, Sandy CLAY, dark grey, trace of gravel	Sandy, CLAY, yellow, red/orange mottling	TOPSOIL, silty SAND, fine to coarse grained, dark brown, with fine subrounded gravel	TOPSOIL, silty SAND, fine to medium grained, brown	TOPSOIL, silty SAND, fine to medium grained, brown, with fine to medium subrounded gravel
Dominant Stratum [C]												CLAY	SAND	CLAY	CLAY	SAND	SAND	CLAY	CLAY	CLAY	CLAY	SAND	SAND	SAND
Sample Purpose												Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment
Sample collected by												RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA-BG	RCA-BG	RCA-BG
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																								
Benzene	0.2	3	4	4	6	9	75	95			430	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	NL	NL	NL	NL	NL	135	135			99000	<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
Ethylbenzene	0.5	NL	NL	NL	NL	NL	165	185			27000	<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
meta- and para-Xylene	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
ortho-Xylene	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
Total Xylenes	1	230	NL	NL	NL	NL	180	95			81000	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
Polycyclic Aromatic Hydrocarbons (PAH)																								
Naphthalene	1	NL	NL	NL	NL	NL	370	370			11000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons (TRH)																								
TRH C_6-C_{10}	10								700	800	26000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH >C_{10}-C_{16}	50						170	170	1000	1000	20000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	100						1700	2500	3500	5000	27000	<100	140	140	<100	<100	100	<100	100	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	100						3300	6600	10000	10000	38000	<100	160	<100	100	<100	140	<100	160	130	<100	<100	<100	<100
F1	10	260	250	310	480	NL	215	215				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2	50	NL	NL	NL	NL	NL						<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

All results are in units of mg/kg.

Blank Cell indicates no criterion available

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laborat

F1 = TRH C_6-C_{10} minus BTEX. F1 PQL deemed equal TRH C_6-C_{10}.

F2 = TRH>C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >C_{10}-C_{16}.

[A] ASC NEPM 1999 (amended April 2013) Vapour Based Health Screening Levels (HSL) 'D' (Commercial/Industrial)

[A] ASC NEPM 1999 (amended April 2013) Ecological Screening Levels (ESL) C&I (Commercial and Industrial)

[A] ASC NEPM 1999 (amended April 2013) Management Limits (ML) Non-Sensitive Sites (Commercial and Industrial)

[A] CRC Care Technical Report 10, September 2011 Direct Contact (DC) Health Screening Levels 'D' (Commercial/Industrial)

[B] Start of sample, generally over a 0.1m interval

[C] Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used

NL designates 'Not Limiting' indicating that the pore water concentration required to constitute a vapour risk is higher than the solubility capacity for that compound based on a petroleum mixture. Vapour is therefore not a risk for this compound.

Results for TRH have been compared to TPH guidelines.

Presented ESL for naphthalene is an Ecological Investigation Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

ESL for TRH >C_{16}-C_{34} and >C_{34}-C_{40} are low reliability

Results shown in **BOLD** are in excess of the vapour based HSL

Results shown in shading are >250% of the vapour based HSL

Results shown in underline are in excess of the ESL

Results shown in *italics* are in excess of the management limit

Results shown in patterned cells are in excess of the direct contact HSL

Where summation required (Xylene, F1, F2) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	PQL	Guideline [A]										TP104	TP105	TP106	TP107	TP108	TP109	RP101	RP102	RP103	RP108	RP109
Sample Depth (m) [B]		HSL 'D'					ESL C&I		Non-sensitive ML		DC D	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Date		SAND 0-<1m	SILT 0-<1m	CLAY 0-<1m	CLAY 1-<2m	CLAY 2-<4m	Coarse	Fine	Coarse	Fine		8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	9/10/19	9/10/19	9/10/19	9/10/19	9/10/19
Sample Profile												TOPSOIL, silty SAND, fine grained, brown, low plasticity silt	TOPSOIL, silty SAND, fine grained, brown	TOPSOIL, sandy SILT, low plasticity, brown	TOPSOIL, sandy SILT, medium plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand
Dominant Stratum [C]												SAND	SAND	SILT	SILT	SILT	SILT	SAND	SAND	SAND	SAND	SAND
Sample Purpose												Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment
Sample collected by												RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																						
Benzene	0.2	3	4	4	6	9	75	95			430	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	NL	NL	NL	NL	NL	135	135			99000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	NL	NL	NL	NL	NL	165	185			27000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- and para-Xylene	0.5											<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	0.5											<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	1	230	NL	NL	NL	NL	180	95			81000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polycyclic Aromatic Hydrocarbons (PAH)																						
Naphthalene	1	NL	NL	NL	NL	NL	370	370			11000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons (TRH)																						
TRH C_6-C_{10}	10								700	800	26000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH >C_{10}-C_{16}	50						170	170	1000	1000	20000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C_{16}-C_{34}	100						1700	2500	3500	5000	27000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH >C_{34}-C_{40}	100						3300	6600	10000	10000	38000	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F1	10	260	250	310	480	NL	215	215				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2	50	NL	NL	NL	NL	NL						<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

All results are in units of mg/kg.
Blank Cell indicates no criterion available
PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laborat
F1 = TRH C_6-C_{10} minus BTEX. F1 PQL deemed equal TRH C_6-C_{10}.
F2 = TRH>C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >C_{10}-C_{16}.
[A] ASC NEPM 1999 (amended April 2013) Vapour Based Health Screening Levels (HSL) 'D' (Commercial/Industrial)
[A] ASC NEPM 1999 (amended April 2013) Ecological Screening Levels (ESL) C&I (Commercial and Industrial)
[A] ASC NEPM 1999 (amended April 2013) Management Limits (ML) Non-Sensitive Sites (Commercial and Industrial)
[A] CRC Care Technical Report 10, September 2011 Direct Contact (DC) Health Screening Levels 'D' (Commercial/Industrial)
[B] Start of sample, generally over a 0.1m interval
[C] Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used
NL designates 'Not Limiting' indicating that the pore water concentration required to constitute a vapour risk is higher than the solubility capacity for that compound based on a petroleum mixture. Vapour is therefore not a risk for this compound.
Results for TRH have been compared to TPH guidelines.
Presented ESL for naphthalene is an Ecological Investigation Level
ESL are applicable for material at less than 2m depths below finished surface/ground level
For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero
ESL for TRH >C_{16}-C_{34} and >C_{34}-C_{40} are low reliability
Results shown in **BOLD** are in excess of the vapour based HSL
Results shown in shading are >250% of the vapour based HSL
Results shown in underline are in excess of the ESL
Results shown in *italics* are in excess of the management limit
Results shown in patterned cells are in excess of the direct contact HSL
Where summation required (Xylene, F1, F2) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	PQL	Guideline [A]		BH101A	BH102A	BH102B	BH103A	BH103C	BH104A	BH105A	BH105C	BH106A	BH107A	BH108A	BH109A	BH109C	BH109D	HA1A	HA2A
Sample Depth (m) [B]		HIL 'D'	EIL C&I	0.1	0.1	0.85	0.1	0.4	0.1	0.1	0.7	0.1	0.1	0.1	0.1	1.5	3	0.1	0.05
Date				3/10/19	24/9/19	24/9/19	25/9/19	25/9/19	30/9/19	26/9/19	26/9/19	2/10/19	2/10/19	2/10/19	1/10/19	1/10/19	1/10/19	2/10/19	2/10/19
Sample Profile				TOPSOIL, Silty CLAY, medium plasticity, brown	FILL, Silty SAND, fine-medium grained, brown, with trace rootlets	CLAY, high plasticity, brown, with orange mottling	TOPSOIL, Silty SAND, fine-medium grained, brown	SLOPEWASH , Silt SAND, fine-medium grained, orange-brown	SLOPEWASH, Silty SAND, fine-medium grained, brown, trace of fine-medium grade gravel	FILL, Gravelly Silty SAND, fine-medium grained, brown, with fine-medium gravel, trace organics	CLAY, medium-hard plasticity, pale grey, with orange mottling	FILL, Gravelly Silty SAND, fing-medium grained, grey/brown, fine to medium grained gravel	FILL, sandy-silty CLAY, medium to high palsticity, grey & pale brown, trace of fine to medium gravel.	FILL, silty sandy GRAVEL, fine to medium subangular, grey, fine to medium grained sand	FILL, Silty SAND, fine to medium grained, brown, with organics	FILL, Gravelly, Sandy CLAY, medium plasticity, grey, fine-medium sub-rounded gravel, trace coal fragments	Tuffaceous CLAY, high plasticity, pale grey	FILL, Silty SAND, fine to medium grained, brown, with rootlets and timber	FILL, gravelly sandy CLAY, grey, with organic material, timber and rootlets
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by				RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - ZL	RCA - ZL
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene	0.5		370	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	0.8	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2.2	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	6.9	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	6.6	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2.4	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(j)fluoranthene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	3.4	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	1.2	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	0.5		1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2.9	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	2.8	<0.5	<0.5	<0.5	<0.5	<0.5
Carcinogenic PAH (B(a)P equivalent)	1.21	40		0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.968	4.112	0.605	0.605	0.605	0.605	0.605
Sum of reported PAH	8	4000		4	4	4	4	4	4	4	4	4	6.4	35.2	4	4	4	4	4
Metals																			
Arsenic	5	3000	160	7	7	6	<5	8	8	6	7	<5	<5	<5	5	9	<5	<5	<5
Cadmium	1	900		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	3600	310	4	13	8	4	6	6	6	6	7	60	87	5	6	3	3	47
Copper	5	240000	400	8	20	<5	29	12	11	12	<5	8	21	50	13	14	7	9	13
Mercury	0.1	730		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	5	1500	1800	12	20	12	19	<5	14	13	7	6	13	78	19	18	<5	15	13
Nickel	2	6000	55	<2	5	3	3	4	4	4	<2	6	4	11	2	3	<2	<2	5
Zinc	5	400000	360	23	73	8	41	34	35	41	7	42	96	334	44	38	7	26	100

All results are in units of mg/kg
Blank Cell indicates no criterion available
PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory
[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).
[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).
[B] Start of sample, generally over a 0.1m interval
The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.
HIL for Chromium are for Chromium VI
Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level
ESL are applicable for material at less than 2m depths below finished surface/ground level
For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero
EIL for Naphthalene are for fresh (<2years) Naphthalene
EIL for Arsenic are for aged (>2years) Arsenic
EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative of the criteria.
EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.
EIL for Lead are the added contaminant limit for aged (>2years) Lead.
EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.
EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.
Results shown in **BOLD** are in excess of the HIL
Results shown in shading are >250% of the HIL
Results shown in underline are in excess of EIL

Sample Identification	PQL	Guideline [A]		HA3A	HA3B	HA4A	HA5A	HA5B	HA6A	HA7A	HA8A	HA8B	HA9A	HA10A	HA10B	HA11A	HA11B	SP1A	SP1B
Sample Depth (m) [B]		HIL 'D'	EIL C&I	0.1	1	0.1	0.1	0.6	0.1	0.1	0.1	0.7	0.1	0.1	0.6	0.1	0.3	0.1	0.9
Date				2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19	2/10/19
Sample Profile				Clayey SAND, fine to medium grained, dark grey, with organic material, rootlets	Sandy CLAY, light grey, with orange mottling, trace rootlets	Clayey SAND, fine to medium grained, pale grey, trace rootlets	TOPSOIL, Silty SAND, black, with organic material	CLAY, pale grey with red/orange mottling	FILL, Gravelly Silty SAND, brown, with organic material	FILL, Gravelly Sandy CLAY, dark grey with orange mottling, with rootlets	Silt SAND, pale brown, trace of sub-angular gravel, with rootlets	CLAY, grey with red/orange mottling	Silty SAND, dark grey, with rootlets	Sandy CLAY, grey, trace of gravel and rootlets	CLAY, pale brown, re/prange mottling	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Silty Sandy CLAY, black, with subangular gravel and rootlets	FILL, Sandy CLAY, dark grey with orange mottling, with rootlets
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark
Sample collected by				RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene	0.5		370	<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
Acenaphthylene	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
Acenaphthene	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
Fluorene	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
Phenanthrene	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
Anthracene	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
Fluoranthene	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
Pyrene	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
Benz(a)anthracene	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
Chrysene	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
Benzo(b)&(j)fluoranthene	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
Benzo(k)fluoranthene	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
Benzo(a) pyrene	0.5		1.4	<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
Indeno(1,2,3-c,d)pyrene	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
Dibenz(a,h)anthracene	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
Benzo(g,h,i)perylene	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
Carcinogenic PAH (B(a)P equivalent)	1.21	40		0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605
Sum of reported PAH	8	4000		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Metals																			
Arsenic	5	3000	160	<5	<5	5	7	11	<5	8	6	6	5	5	7	8	9	<5	<5
Cadmium	1	900		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	3600	310	3	5	4	8	8	8	6	12	6	4	4	7	8	10	4	3
Copper	5	240000	400	12	<5	13	6	<5	7	14	13	<5	20	10	<5	35	33	18	18
Mercury	0.1	730		<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	<0.1	<0.1
Lead	5	1500	1800	12	10	21	9	9	12	22	13	11	28	23	10	25	26	26	38
Nickel	2	6000	55	<2	<2	<2	<2	<2	3	4	4	<2	2	2	<2	4	4	<2	<2
Zinc	5	400000	360	23	<5	32	21	<5	38	66	46	8	44	45	8	70	68	34	43

All results are in units of mg/kg
Blank Cell indicates no criterion available
PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory
[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).
[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).
[B] Start of sample, generally over a 0.1m interval
The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.
HIL for Chromium are for Chromium VI
Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level
ESL are applicable for material at less than 2m depths below finished surface/ground level
For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero
EIL for Naphthalene are for fresh (<2years) Naphthalene
EIL for Arsenic are for aged (>2years) Arsenic
EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative of the criteria.
EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.
EIL for Lead are the added contaminant limit for aged (>2years) Lead.
EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.
EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.
Results shown in **BOLD** are in excess of the HIL
Results shown in shading are >250% of the HIL
Results shown in underline are in excess of EIL

Sample Identification	PQL	Guideline [A]		SP2A	SP2B	TP101	TP102	TP103	TP104	TP105	TP106	TP107	TP108	TP109	RP101	RP102	RP103	RP108	RP109
Sample Depth (m) [B]		HIL 'D'	EIL C&I	0.3	0.9	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
Date				2/10/19	2/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	8/10/19	9/10/19	9/10/19	9/10/19	9/10/19	9/10/19
Sample Profile				FILL, Sandy CLAY, dark grey, trace of gravel	Sandy, CLAY, yellow, red/orange mottling	TOPSOIL, silty SAND, fine to coarse grained, dark brown, with fine subrounded gravel	TOPSOIL, silty SAND, fine to medium grained, brown	TOPSOIL, silty SAND, fine to medium grained, brown, with fine to medium subrounded gravel	TOPSOIL, silty SAND, fine grained, brown, low plasticity silt	TOPSOIL, silty SAND, fine grained, brown	TOPSOIL, sandy SILT, low plasticity, brown	TOPSOIL, sandy SILT, medium plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand
Sample Purpose				Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment
Sample collected by				RCA - ZL	RCA - ZL	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene	0.5		370	<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
Acenaphthylene	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
Acenaphthene	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
Fluorene	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
Phenanthrene	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
Anthracene	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
Fluoranthene	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	1.3	<0.5	<0.5
Pyrene	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	1.2	<0.5	<0.5
Benz(a)anthracene	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
Chrysene	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
Benzo(b)&(j)fluoranthene	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	0.8	<0.5	<0.5
Benzo(k)fluoranthene	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
Benzo(a) pyrene	0.5		1.4	<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	0.7	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	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
Dibenz(a,h)anthracene	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
Benzo(g,h,i)perylene	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
Carcinogenic PAH (B(a)P equivalent)	1.21	40		0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	0.605	1.135	0.605	0.605
Sum of reported PAH	8	4000		4	4	4	4	4	4	4	4	4	4	4	4	4	7.25	4	4
Metals																			
Arsenic	5	3000	160	<5	<5	<5	<5	5	<5	5	<5	<5	10	<5	6	10	<5	10	9
Cadmium	1	900		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	3600	310	6	3	4	3	5	4	2	3	3	8	4	17	12	22	14	15
Copper	5	240000	400	13	<5	13	9	10	14	19	15	12	<5	15	11	15	9	16	16
Mercury	0.1	730		<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	<0.1	<0.1
Lead	5	1500	1800	23	30	30	16	17	19	54	28	16	8	23	9	9	16	9	8
Nickel	2	6000	55	3	<2	2	<2	2	<2	<2	<2	<2	<2	3	10	22	6	23	28
Zinc	5	400000	360	36	<5	157	30	28	24	36	25	20	8	46	54	52	64	67	103

All results are in units of mg/kg
Blank Cell indicates no criterion available
PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory
[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).
[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).
[B] Start of sample, generally over a 0.1m interval
The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.
HIL for Chromium are for Chromium VI
Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level
ESL are applicable for material at less than 2m depths below finished surface/ground level
For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero
EIL for Naphthalene are for fresh (<2years) Naphthalene
EIL for Arsenic are for aged (>2years) Arsenic
EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative of the criteria.
EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.
EIL for Lead are the added contaminant limit for aged (>2years) Lead.
EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.
EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.
Results shown in **BOLD** are in excess of the HIL
Results shown in shading are >250% of the HIL
Results shown in underline are in excess of EIL

TIER 1 - Total Concentrations WITHOUT Leaching Test

Sample Identification	PQL	Total Concentration [A]		BH101A	BH102A	BH102B	BH103A	BH103C	BH104A	BH105A	BH105C	BH106A	BH107A	BH108A
Depth		General Solid	Restricted Solid	0.1	0.1	0.85	0.1	0.4	0.1	0.1	0.7	0.1	0.1	0.1
Sample Date				3/10/2019	24/09/2019	24/09/2019	25/09/2019	25/09/2019	30/09/2019	26/09/2019	26/09/2019	2/10/2019	2/10/2019	2/10/2019
Sample Profile				TOPSOIL, Silty CLAY, medium plasticity, brown	FILL, Silty SAND, fine-medium grained, brown, with trace rootlets	CLAY, high plasticity, brown, with orange mottling	TOPSOIL, Silty SAND, fine-medium grained, brown	SLOPEWASH, Silt SAND, fine-medium grained, orange-brown	SLOPEWASH, Silty SAND, fine-medium grained, brown, trace of fine-medium grade gravel	FILL, Gravelly Silty SAND, fine-medium grained, brown, with fine-medium gravel, trace organics	CLAY, medium-hard plasticity, pale grey, with orange mottling	FILL, Gravelly Silty SAND, fing-medium grained, grey/brown, fine to medium grained gravel	FILL, sandy-silty CLAY, medium to high palsticity, grey & pale brown, trace of fine to medium gravel.	FILL, silty sandy GRAVEL, fine to medium subangular, grey, fine to medium grained sand
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by				RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC	RCA - RC
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)														
Benzene	0.2	10	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	288	1152	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	600	2400	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene	1	1000	4000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Recoverable Hydrocarbons (TRH)														
TRH C_6-C_9	10	650	2600	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH C_{10}-C_{36}	250	10000	40000	125	125	125	125	125	125	125	195	435	605	325
Polycyclic Aromatic Hydrocarbons (PAH)														
Benzo(a) pyrene	0.5	0.8	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	**2.9**
Sum of Reported PAH	8	200	800	4	4	4	4	4	4	4	4	4	6.4	35.2
Metals														
Arsenic	5	100	400	7	7	6	<5	8	8	6	7	<5	<5	<5
Cadmium	1	20	80	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	100	400	4	13	8	4	6	6	6	6	7	60	87
Mercury	0.1	4	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Lead	5	100	400	12	20	12	19	<5	14	13	7	6	13	78
Nickel	2	40	160	<2	5	3	3	4	4	4	<2	6	4	11
Tier 1 Sample Classification				General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	**Restricted Solid Waste**

All results are in units of mg/kg.

PQL = Practical Quantitation Limit.

[A] NSWEPA Waste Classification Guidelines, November 2014. Table 1, CT1 and CT2. Table 2, TCLP1 and TCLP2

Guidelines reported for Chromium are for Chromium VI

Results for TRH have been compared to TPH guidelines.

Results shown in ***BOLD*** are in excess of the General Solid Waste criteria

Results shown in ***shading*** are in excess of the Restricted Solid Waste criteria

Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL. Underlined summations are those not detected

TIER 1 - Total Concentrations WITHOUT Leaching Test

Sample Identification	PQL	Total Concentration [A]		BH109A	BH109C	BH109D	HA1A	HA2A	HA3A	HA3B	HA4A	HA5A	HA5B	HA6A	HA7A	HA8A	HA8B
Depth		General Solid	Restricted Solid	0.1	1.5	3	0.1	0.05	0.1	1	0.1	0.1	0.6	0.1	0.1	0.1	0.7
Sample Date				1/10/2019	1/10/2019	1/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019
Sample Profile				FILL, Silty SAND, fine to medium grained, brown, with organics	FILL, Gravelly, Sandy CLAY, medium plasticity, grey, fine-medium sub-rounded gravel, trace coal fragments	Tuffaceous CLAY, high plasticity, pale grey	FILL, Silty SAND, fine to medium grained, brown, with rootlets and timber	FILL, gravelly sandy CLAY, grey, with organic material, timber and rootlets	Clayey SAND, fine to medium grained, dark grey, with organic material, rootlets	Sandy CLAY, pale grey with orange mottling, trace of rootlets	Clayey SAND, fine to medium grained, pale grey, trace rootlets	TOPSOIL, Silty SAND, black, with organic material	CLAY, pale grey with red/orange mottling	FILL, Gravelly Silty SAND, brown, with organic material	FILL, Gravelly Sandy CLAY, dark grey with orange mottling, with rootlets	Silt SAND, pale brown, trace of sub-angular gravel, with rootlets	CLAY, grey with red/orange mottling
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by				RCA - RC	RCA - RC	RCA - RC	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																	
Benzene	0.2	10	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	288	1152	<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
Ethylbenzene	0.5	600	2400	<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
Xylene	1	1000	4000	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
Total Recoverable Hydrocarbons (TRH)																	
TRH C_6-C_9	10	650	2600	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH C_{10}-C_{36}	250	10000	40000	245	245	125	125	385	125	125	125	125	125	375	125	125	125
Polycyclic Aromatic Hydrocarbons (PAH)																	
Benzo(a) pyrene	0.5	0.8	3.2	<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	<0.5
Sum of Reported PAH	8	200	800	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Metals																	
Arsenic	5	100	400	5	9	<5	<5	<5	<5	<5	5	7	11	<5	8	6	6
Cadmium	1	20	80	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	100	400	5	6	3	3	47	3	5	4	8	8	8	6	12	6
Mercury	0.1	4	16	<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
Lead	5	100	400	19	18	<5	15	13	12	10	21	9	9	12	22	13	11
Nickel	2	40	160	2	3	<2	<2	5	<2	<2	<2	<2	<2	3	4	4	<2
Tier 1 Sample Classification				General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste

All results are in units of mg/kg.

PQL = Practical Quantitation Limit.

[A] NSWEPA Waste Classification Guidelines, November 2014. Table 1, CT1 and CT2. Table 2, TCLP1 and TCLP2

Guidelines reported for Chromium are for Chromium VI

Results for TRH have been compared to TPH guidelines.

Results shown in ***BOLD*** are in excess of the General Solid Waste criteria

Results shown in ***shading*** are in excess of the Restricted Solid Waste criteria

Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL. Underlined summations are those not detected

TIER 1 - Total Concentrations WITHOUT Leaching Test

Sample Identification	PQL	Total Concentration [A]		HA9A	HA10A	HA10B	HA11A	HA11B	SP1A	SP1B	SP2A	SP2B	TP101	TP102	TP103	TP104
Depth		General Solid	Restricted Solid	0.1	0.1	0.6	0.1	0.3	0.1	0.9	0.3	0.9	0.1	0.1	0.1	0.1
Sample Date				2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	2/10/2019	8/10/2019	8/10/2019	8/10/2019	8/10/2019
Sample Profile				Silty SAND, dark grey, with rootlets	Sandy CLAY, grey, trace of gravel and rootlets	CLAY, pale brown, re/prange mottling	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Gravelly Silty SAND, fine to medium grained, grey	FILL, Silty Sandy CLAY, black, with subangular gravel and rootlets	FILL, Sandy CLAY, dark grey with orange mottling, with rootlets	FILL, Sandy CLAY, dark grey, trace of gravel	Sandy, CLAY, yellow, red/orange mottling	TOPSOIL, silty SAND, fine to medium grained, brown	TOPSOIL, silty SAND, fine to medium grained, brown, with fine to medium subrounded gravel	TOPSOIL, silty SAND, fine grained, brown, low plasticity silt	TOPSOIL, silty SAND, fine grained, brown
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Material adjacent HMRI carpark	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment
Sample collected by				RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA - ZL	RCA-BG	RCA-BG	RCA-BG	RCA-BG
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)																
Benzene	0.2	10	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	288	1152	<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
Ethylbenzene	0.5	600	2400	<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
Xylene	1	1000	4000	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
Total Recoverable Hydrocarbons (TRH)																
TRH C_6-C_9	10	650	2600	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH C_{10}-C_{36}	250	10000	40000	195	175	125	125	175	125	185	125	125	125	125	125	125
Polycyclic Aromatic Hydrocarbons (PAH)																
Benzo(a) pyrene	0.5	0.8	3.2	<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
Sum of Reported PAH	8	200	800	4	4	4	4	4	4	4	4	4	4	4	4	4
Metals																
Arsenic	5	100	400	5	5	7	8	9	<5	<5	<5	<5	<5	<5	5	<5
Cadmium	1	20	80	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	100	400	4	4	7	8	10	4	3	6	3	4	3	5	4
Mercury	0.1	4	16	<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
Lead	5	100	400	28	23	10	25	26	26	38	23	30	30	16	17	19
Nickel	2	40	160	2	2	<2	4	4	<2	<2	3	<2	2	<2	2	<2
Tier 1 Sample Classification				General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste

All results are in units of mg/kg.

PQL = Practical Quantitation Limit.

[A] NSWEPA Waste Classification Guidelines, November 2014. Table 1, CT1 and CT2. Table 2, TCLP1 and TCLP2

Guidelines reported for Chromium are for Chromium VI

Results for TRH have been compared to TPH guidelines.

Results shown in ***BOLD*** are in excess of the General Solid Waste criteria

Results shown in ***shading*** are in excess of the Restricted Solid Waste criteria

Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL. Underlined summations are those not detected

TIER 1 - Total Concentrations WITHOUT Leaching Test

Sample Identification	PQL	Total Concentration [A]		TP105	TP106	TP107	TP108	TP109	RP101	RP102	RP103	RP108	RP109
Depth		General Solid	Restricted Solid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample Date				8/10/2019	8/10/2019	8/10/2019	8/10/2019	8/10/2019	9/10/2019	9/10/2019	9/10/2019	9/10/2019	9/10/2019
Sample Profile				TOPSOIL, sandy SILT, low plasticity, brown	TOPSOIL, sandy SILT, medium plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	TOPSOIL, sandy SILT, low plasticity, brown, fine grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand	FILL, silty sandy GRAVEL, grey, fine to medium grained sand
Sample Purpose				Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment	Investigation Proposed Road Alignment
Sample collected by				RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG	RCA-BG
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)													
Benzene	0.2	10	40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	288	1152	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	600	2400	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene	1	1000	4000	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Recoverable Hydrocarbons (TRH)													
TRH C_6-C_9	10	650	2600	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH C_{10}-C_{36}	250	10000	40000	125	125	125	125	125	125	125	125	125	125
Polycyclic Aromatic Hydrocarbons (PAH)													
Benzo(a) pyrene	0.5	0.8	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5
Sum of Reported PAH	8	200	800	4	4	4	4	4	4	4	4.45	4	4
Metals													
Arsenic	5	100	400	5	<5	<5	10	<5	6	10	<5	10	9
Cadmium	1	20	80	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	2	100	400	2	3	3	8	4	17	12	22	14	15
Mercury	0.1	4	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead	5	100	400	54	28	16	8	23	9	9	16	9	8
Nickel	2	40	160	<2	<2	<2	<2	3	10	22	6	23	28
Tier 1 Sample Classification				General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste	General Solid Waste

All results are in units of mg/kg.

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Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL. Underlined summations are those not detected