Crescent Newcastle Pty Ltd
Proposed Multi - Building Residential Development
754-NTLGE220504-AJ

Phase 2 Detailed Site Investigation

23 June 2019

Pour trust
into your
foundations
and you
can build
anything

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Phase 2 Detailed Site Investigation, Proposed Multi - Building Residential Development

Prepared for
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Executive Summary

The site is currently occupied by the NBN Television broadcast facility constructed during the 1960's (1961-1962). A review of available information indicates the site was vacant land until the commencement of construction in 1961. An examination of historical, near ground level photographs (source: Newcastle Lost Facebook Group 2018 – Photo Credit Unknown) showing the construction of the NBN TV facility confirms that the building was erected in a significantly cut portion of the hill (cut specifically for construction).

The site use has not changed since the 1960s and the number of buildings on site and their respective sizes, has progressively increased. Retaining walls were also constructed through the years along with the addition of significant areas of concrete pavement and bitumen roads.

As a result of the elevation profile across the site (elevation changes from approximately 36m to 52m AHD from Mosbri Crescent moving due east), fill depth is variable, although typically quite shallow (i.e. < 1.0m bgs). It was observed that in BH04 (PSI) and BH07 (DSI) the fill depth was deeper (1.6 - 2.8m thick) given the fill used during retaining wall construction on the eastern side (rear) of the property.

A total of eleven (11) primary locations have been sampled across both preliminary and detailed site investigations with the fill showing little evidence of chemical contamination, i.e. COPC tested resulted in concentrations below the investigation levels for the assessment. There was some evidence of uncontrolled fill (building rubble including bricks, steel, concrete blocks etc.) at BH04 during the PSI with bricks, slag and rebar observed at BH07 (which is in close proximity to BH04) during this DSI. Samples collected from both locations showed little evidence of chemical contamination with the COPC assessed below the SAC.

Based on the findings of this assessment it is considered that the Site is suitable for the proposed land use scenario of residential with minimal access to soil.

The following are recommended prior to the commencement of demolition works:

- **Review of the Hazardous Materials Register** – Any existing Hazardous Materials Register (s) should be reviewed for currency and an assessment made as to whether the Register is suitable to provide WHS guidance during demolition of building structures.
- **Hazardous Materials Survey** – Should a current Hazardous Materials Register not be available, it is recommended that a Hazardous Materials Survey be carried out on the main building and ancillary structures prior to demolition works. An up-to-date Hazardous Materials Register must be prepared following the completion of the Survey.
- **Construction Environmental Management Plan –** A Construction Environmental Management Plan (CEMP) must be prepared by the construction contractor and implemented prior to the commencement of bulk earthworks.
- **Unexpected Finds Protocol –** An unexpected finds protocol must be included as part of the CEMP or as a stand-alone document in order to manage potentially contaminated fill material that may be encountered during the civil construction phase.

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1. Introduction

Crescent Newcastle Pty Ltd (Stronach) are planning to re-develop the site located at11-17 Mosbri Crescent, Cooks Hill, NSW into high rise residential apartments. Stronach requested Coffey Services Australia Pty Ltd (Coffey) undertake a Detailed Site Investigation (DSI), based on Newcastle City Council (Council) review of the Development Application. Council recommended that the DSI be completed prior to the demolition of the main site structures.

The DSI was conducted in general accordance with the *NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites, National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 1999, amended 2013), Managing Land Contamination: Planning Guidelines (SEPP 55) - Remediation of Land (1998)* and the NSW EPA *Waste Classification Guidelines*, 2014 (Waste Classification Guidelines).

1.1. Background

Coffey has previously undertaken a Preliminary Contamination Assessment (PCA) at 11-17 Mosbri Crescent, Cooks Hill, NSW (the Site) (Coffey Ref: 754-NTLENGE220504-AB dated the 14/12/2018,). The objectives of the PCA were to:

- Identify evidence of potentially contaminating activities that may be currently occurring or had historically occurred on the site;
- Identify and assess Areas of Environmental Concern (AEC's) and Chemicals of Potential Concern (COPC's) for the site, and develop a preliminary conceptual site model if required; and
- Provide recommendations for further assessment and or management, as required.

The PCA concluded that:

"the Site can be rendered suitable for the proposed residential land use, provided the following recommendations are carried out:

- ***Detailed Site Investigation (Post-demolition of buildings and post-clearance and removal of hardstand and other structures) –*** *A detailed site investigation should be undertaken targeting the exposed fill areas following complete removal of the buildings and hardstand structures. This will allow a more fulsome assessment of the fill extent and quality and also establish a preliminary waste classification of the materials.*
- ***Review of the Hazardous Materials Register*** *– Any existing Hazardous Materials Register (s) should be reviewed for currency and an assessment made as to whether the Register is suitable to provide WHS guidance during demolition of building structures.*
- ***Hazardous Materials Survey*** *– Should a current Hazardous Materials Register not be available, it is recommended that a Hazardous Materials Survey be carried out on the main building and ancillary structures prior to demolition works. An up-to-date Hazardous Materials Register must be prepared following the completion of the Survey.*
- ***Construction Environmental Management Plan –*** *A Construction Environmental Management Plan (CEMP) must be prepared by the construction contractor and implemented prior to the commencement of bulk earthworks.*
- ***Unexpected Finds Protocol –*** *An unexpected finds protocol must be included as part of the CEMP or as a stand-alone document in order to manage potentially contaminated fill material that may be encountered during the civil construction phase."*

1.2. Objectives

The objectives of the DSI were to:

- Identify and assess Areas of Environmental Concern (AEC's) and Chemicals of Potential Concern (COPC's) for the site, and update the preliminary conceptual site model (CSM) included in the PSI reporting;
- Provide an understanding of the contamination status of fill soils at the site through sampling and laboratory analysis; and
- Provide a statement of land suitability for the proposed development and recommendations for further assessment and or management, as required.

1.3. Scope of Works

In order to meet the above objectives, the following scope of works was undertaken:

- Development of a Health, Safety, Security and Environment site safety plan;
- Collection of Dial Before You Dig (DBYD) plans and service location of proposed sampling locations;
- Non-Destructive Drilling (Excavation) of seven (7) boreholes, with logging of borehole profiles and collection of soil samples;
- Laboratory analysis of selected soil samples for a suite of chemicals of potential concern, plus appropriate quality control samples; and
- Preparation of a contamination assessment report.

2. Site background

2.1. Site Identification

The site location and site plan are shown in Figure 1 and Figure 2 of Appendix A respectively. Site identification details are provided in Table 2-1.

Table 2-1: Site Identification

Site Address	**11 – 17 Mosbri Crescent, The Hill 2300**
Approximate Site Area	1.3 Hectares (Total Site); 0.4 Ha (Pavement and hardstand).
Title Identification Details	Lot 1 DP 204077
Current Land Zoning	Per the Section 10.7 Report form the Newcastle City Council (NCC) the site is zoned as: • R3 Medium Density Residential
Current Land Use	Currently occupied by the NBN Television Broadcast Studio
Proposed Land Use	Proposes Multi-Building Residential Development
Adjoining Site Uses	• North – Medium density residential – Pit Street; • South – Medium density residential – Hillview Crescent; • East – Vacant bushland – Wolfe Street; • West – Medium density residential – Mosbri Crescent.
Site Coordinates	The centre of the site is located approximately at 32°55'54.18"S, 151°46'37.21"E

2.2. Site Topography and Drainage

2.2.1. Geology and Soils

Reference to the 1:100,000 scale Newcastle Coalfield Geology map (Sheet 9231), the site is underlain by the boundary between late Permian aged Lambton Subgroup and the Adamstown Subgroup (Upper portions of the site) of the Newcastle Coal Measures. These subgroups comprise sandstone, siltstone, claystone, coal and tuff.

During investigations into the soils underlying the site using a non-destructive drill rig (sucker truck) on the 5th June 2019, Coffey observed the following soil profile:

Table 2-2: Summary of borehole soil profile

Material Type	Material Description	Approximate Depth (mbgs)
Road Wearing Course	Bitumen and Asphalt – Black and grey	0.0 – 0.1
Fill	Sandy Gravel with cobbles – fine to coarse grained, orange-brown, black, grey, brown Sandy Clay – fine to medium grained, medium to high plasticity, brown, grey	0.1 – 1.6

	Gravel with cobbles – fine to coarse grained, black, grey, slag skulls present	
Natural: Residual soil	Sandy Clay – fine to medium grained, medium to high plasticity, brown, grey and red-brown Clay – medium to high plasticity, white, grey, brown, traces mottled red-orange	0.25 – 2.0
Natural: Extremely Weathered Rock	Sandstone – fine to medium grained, orange-brown	0.3 (BH02 and BH03) 1.1 (BH04)

2.2.2. Acid Sulfate Soils

Reference to the Newcastle 1:25,000 DLWC Acid Sulfate Soil Risk Map indicates that the site is located in an area of no known occurrence of Acid Sulfate Soils (ASS).

2.2.3. Hydrogeology and Drainage

Groundwater beneath the site is anticipated to be present at depths greater than 10 metres below the ground surface. Regional groundwater flow is anticipated to follow the general slope of the region to the northwest ultimately discharging into the Hunter River.

Surface water leaving the site is likely to follow the topography and flow into municipal downstream stormwater drains forming part of the Cottage Creek Catchment. Water collected within the Cottage Creek catchment has a discharge point into the Hunter River approximately 1.4km north west of the site.

A search of the Water NSW registered groundwater bores located within a 500m radius of the site was undertake. The search revealed one groundwater bore within this radius and is included in Table 2-3. The details of the registered bore are summarised below.

Table 2-3: Summary of groundwater bore search

Bore ID	Status	Purpose	Approximate Distance from Site
GW202514	Active	Monitoring Bore	430m North West

2.3. Site history review summary

A review of historical imagery for the site (included in the PSI report) indicated the site was undeveloped bushland in 1954. A review of the 1966 imagery showed a large building constructed at the Site which was used for the Newcastle Broadcasting and Television Corporation. Further development to the structures and associated facilities continued during the following five decades.

- The site was not listed on the NSW EPA Contaminated Land Register or NSW POEO Act public register.
- The risk associated with nearby properties identified on the NSW EPA Contaminated Register or NSW POEO Act public register was considered low.
- The site was not identified to be within an area of potential acid sulfate soils.
- The following were identified as areas of environmental concern;
  - Fill of unknown quantity and origin;

- Potential use of coal tar and slag for pavement construction; and
- Potential for leaks and spills surrounding the electrical generator to access subsurface soils through surface cracks.

The building was constructed between 1961 and 1962. Photographs of the construction in progress were included in Appendix F of the PSI.

3. Data Quality Objectives

As stated in Section 18 (Appendix B) of Schedule B2 'Guideline on Site Characterisation' of the *National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM)* 2013, Data Quality Objectives (DQOs) are used to "define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site".

DQOs were developed for this project as summarised in Table 3-1.

Table 3-1: Summary of Data Quality Objectives

Step 1: State the Problem	The primary objectives of the contamination assessment have been used to identify the problem: • What is the likelihood of contamination associated with fill materials used historically on the site, primarily beneath roads and hardstand areas (parking lots)? • Is the site suitable for the proposed residential development (with minimal access to soils)?
Step 2: Identify the Decision	Decision Statement: • What is the nature and extent of contamination on the site? • Does the contamination, if identified, pose an unacceptable risk to human health and the environment in the context of the proposed mixed commercial-residential land use? • Are there any direct exposure pathways? • Is there a potential risk for offsite migration of contamination? • Is the site suitable for residential land use?
Step 3: Identify Inputs to the Decision	Decisions that need to be made to resolve the decision statement: • What media, that is, soil, groundwater, soil vapour should be assessed? • What is an adequate number of sampling locations in accordance with recommendations in NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines? • Is sampling on a grid pattern suitable for the project objectives? • Do the number of samples analysed for each chemical of concern provide an adequate data set to complete a statistical appraisal? • Does the data adequately represent the conditions on site? The information inputs required to assess compliance within the NSW EPA (2017) *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme, 3rd edition* include: • Quality Assurance/ Quality Control (QA/QC) records and assessment; • Data to be collected by Coffey including field observations and laboratory analytical results; • Assessment criteria outlined in this document (see Section 5); • Applicable to NSW EPA guidelines. Environmental variables to be measured: • Initially, concentrations of chemicals of concern within fill material at the site to determine if other variables require measurement.

	Media to be collected: • Fill materials.
Step 4: Decision rule	• The decision rule for soil for each chemical/layer to assess the suitability of the site will be as follows: ▪ QA/QC assessment indicates that the data is usable; ▪ Where contaminant concentrations for each sample are below the adopted investigation levels, then no further assessment is required with respect to that chemical/media/area; ▪ Where contaminant concentrations are reported above the adopted investigation levels, further investigation, risk assessment and/or statistical analyses may be required. If identified contamination poses an unacceptable risk to human health and/or the environment, then remediation and/or implementation of appropriate controls would be required to reduce risk to acceptable levels.
Step 6: Acceptable Limits on Decision Error	There are two types of decision errors: • Sampling errors (Type 1), that occur when the samples collected are not representative of the conditions within the investigation; and • Measurement errors (Type 2), which occur during sample collection, handling, preparation, analysis and data reduction. These errors may lead the decision maker to make the following errors: • Deciding that the site is not contaminated and, therefore the site is suitable for redevelopment when it is not; and • Deciding that the site is contaminated and, therefore, the site is not suitable for redevelopment when it is. The consequences of a type 2 error are less than a type 1 error and therefore we propose a greater limit on the type 2 error (approximately 95% probability). An assessment of potential decision error will be made using a QA/QC assessment for field and laboratory considerations of 5 key data quality indicators (Section 6.1) and the closeness of the data to the assessment criteria. Additionally, statistical methods may be used, where a portion of results is above a particular criterion to demonstrate that the result population is acceptable at 95% confidence. The null hypothesis for this study is: • Contaminant concentrations at the site are above the adopted investigation/ screening levels.
Step 7: Optimise the Design for Obtaining Data	Based on the previous Steps 1 to 6 of the DQO process, the optimal design for obtaining the required data is presented in the following sections (i.e. proposed field and laboratory program).

4. Sampling and Analysis Plan

4.1. Investigation locations

Based on the outcomes of the Coffey (2018) PSI, the highest risk for contamination was found to be associated with the on-site fill materials beneath the roads and pavements. Soil sampling for the DSI was undertaken at seven (7) locations across the site. Note that the sampling did not conform to minimum sampling design guideline requirements for the entire 1.3 Ha site. The roadways and parking areas were sampled (11 locations in total to cover the approximately 4,000m^2 (0.4 Ha) of road and pavement area). Four (4) locations were previously sampled in the PSI and a further 7 locations were identified for sampling during this DSI. Based on an examination of historical imagery and topographic maps, the material below the existing building was generally suspected to be VENM, based on the original cut made in the surrounding landscape for the establishment of the building in the 1960's.

The data from the seven (7) locations completed in the DSI were combined with the four (4) locations completed during the PSI for the final assessment of site contamination. The locations sampled during both the PSI and DSI are shown on Figure 2.

Assessment of potential contamination within soil included the placement of boreholes at seven (7) locations using non-destructive digging to a maximum depth of 2.0 mBGL. Drilling was completed on 5 June 2019. Groundwater inflow was not observed during the drilling of boreholes.

4.1.1. Sampling Methods

The assessment works followed methods outlined in Table 4-1.

Table 4-1: Soil Sampling Procedure

Activity	Detail/ Comments
Below Ground Service Clearance	Dial-Before-You-Dig (DBYD) service plans for the site and immediately surrounding area were reviewed prior to commencement of intrusive investigation works. Given the extensive network of services present within the site boundaries, an excavation exclusion map was prepared prior to undertaking service location in the field in order to identify no-go areas for assessment. Investigation locations outside of the identified exclusion zones were scanned for the presence of buried services by an underground service clearance sub-contractor using an electromagnetic detector.
Soil Sampling	Boreholes were advanced using non-destructive excavation with soil samples collected from boreholes BH01 to BH07 by hand from the sides of the borehole.
Soil Logging	Boreholes were logged by a suitably qualified and experienced Coffey scientist in accordance with Coffey's Standard Operating Practice (SOP), which was consistent with the Unified Soil Classification System (USCS) and Section 7.3, Field Description of Soils, in Schedule B2 of the ASC NEPM. Borehole logs are included in Appendix B.
Soil Screening	Soil samples were screened in the field for the presence of ionisable volatile organic compounds (VOCs) using a Photoionisation Detector (PID) fitted with a 10.6eV lamp. The PID was bump tested using 100ppm isobutylene in air and

	also in fresh air at the start of each day. Calibration certificates are presented in Appendix E. Headspace screening results are recorded on borehole logs in Appendix B.
Sample Handling and Transportation	Sample collection, storage and transport were in general accordance with Coffey's SOP. Soil samples were placed into laboratory prepared and supplied glass jars, fitted with Teflon lined seals to limit possible volatile loss. Sample jars were filled to minimise headspace. The samples were placed into ice chilled coolers and dispatched to NATA accredited laboratories for analysis under Chain of Custody (CoC) control. CoC records are included with the laboratory certificates in Appendix D.
Soil Laboratory Analysis	Soil samples were analysed for COPCs described below in Section 4.1.2. Analysis was completed by NATA accredited laboratories ALS and Envirolab.
QA/QC Samples	To measure the accuracy and precision of the data generated by the field and laboratory procedures for this assessment, Coffey collected and analysed the following quality assurance / quality control (QA/QC) samples: • One intra-laboratory duplicate soil sample; • One inter-laboratory triplicate soil sample; and • One trip blank sample was included in the batch of samples to assess whether any contamination may have been introduced to the samples during shipping and field handling procedures. Quality Assurance/ Quality Control (QA/QC) validation reported in Section 6.

4.1.2. Analytical Schedule

Samples were analysed by ALS in Smithfield (primary laboratory) and Envirolab in Sydney (secondary laboratory). Both laboratories are NATA accredited for the analytes selected.

The primary soil samples were submitted for laboratory analysis for a suite of chemicals of potential concern as summarised in Table 4-2. COPC were assigned to samples which were selected to achieve widespread characterisation of the soils at the site.

Table 4-2: Summary of Soil Sample Analysis

Chemicals of Concern	No. Primary Soil Samples
TRH	11
BTEX	11
PAH	11
Heavy metals	11
Asbestos	11

TRH= total recoverable hydrocarbons; BTEX = benzene, toluene, ethylbenzene, xylenes; PAH= Polycyclic aromatic hydrocarbons; Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury (inorganic), nickel, zinc).

5. Fieldwork and laboratory testing

Fieldwork activities were undertaken at the site on 5th June 2019 to further assess the fill materials and assess potentially complete exposure pathways. The sampling locations are shown on Figure 2 in Appendix B.

5.1. Scope of Works

The following scope of works was undertaken:

- Advancement of seven (7) boreholes by non-destructive drilling methods with sampling targeting fill layers (variable depths at each location);
- Eleven (11) primary soil samples were collected. One sample each from BH02, BH03 and BH04 and two samples each from BH01, BH05, BH06 and BH07 were analysed for COPC;
- Visual and olfactory observations were noted on field screening sheets and included in borehole logs in Appendix B. Soil samples were collected using a fresh pair of disposable nitrile gloves to prevent cross-contamination. Soil samples were placed in clean, laboratory supplied acid washed glass jars. Samples were stored in an ice chilled chest for transport to the laboratory; and
- The soil samples were submitted selectively for laboratory analysis for identified COPC's including:
  - Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
  - Total Recoverable Hydrocarbons (TRH);
  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX); and
  - Asbestos (Presence/ Absence);

5.2. Assessment Criteria

Health-based criteria are used to assess the contamination status at the site. Waste classification criteria have been included where offsite disposal of soils during site redevelopment work is required. Considering that the site surface of the proposed development will be covered with building structures and pavements with minimal access to soils (landscaped communal areas), the following criteria have not been considered for this investigation:

- Ecological investigation levels (EILs) and Ecological Screening Levels (ESLs);
- Management limits for petroleum hydrocarbons have not been considered; and
- Aesthetics.

5.3. Health-based Criteria

The "HIL B" exposure scenario described in Schedule B7 of the ASC NEPM has been selected for the site to reflect the most conservative intended site use. The ground floors will have residential occupancy with limited access to soils.

Chemicals with sufficient volatility to pose potential health risks via vapour inhalation pathway; namely TRH F1 and F2 fractions, BTEX and naphthalene concentrations were compared to the soil Health Screening Levels (HSLs) for vapour intrusion applicable to Residential (i.e. HSL B) listed in Table 1A (3) in Schedule B1 of the ASC NEPM.

The adopted screening levels apply to sandy soil (<1.0m depth).

The Health Investigation Levels (HILs) for heavy metals, PAH and pesticides in soils are selected from relevant values in Table 1A (1) in Schedule B1 of the ASC NEPM. Adopted values for health-based criteria are summarised in Table 5-1.

Table 5-1: Summary of Adopted Health Investigation Levels in Soil

Analyte	HILs for Residential B (mg/kg)
Arsenic (total)	500
Cadmium	140
Chromium (VI)[1]	500
Copper	30,000
Lead	1,200
Mercury (inorganic)	600
Nickel	900
Zinc	60,000
Carcinogenic PAHs as B(a)P TEQ[2]	4
Total PAHs	400
Phenol	50,000
Cresols	5,500
Pentochlorophenol	150
DDT+DDD+DDE	700
Aldrin + Dieldrin	10
Chlordane	100
Endosulfan	460
Endrin	20
Heptachlor	10
HCB	20
Methoxychlor	550

[1] Laboratory Total Chromium results (or Total Chromium minus Chromium III) will be assessed against the HIL for Chromium VI as an initial screening assessment.
[2] TEQ = Toxicity Equivalent Quotient

The HSLs for TRH, BTEX and naphthalene in soils are summarised in Table 5-2. HSLs for sandy soils have been adopted based on the dominant soil texture.

Table 5-2: Summary of Health Screening Levels in Soil

Chemical	HSL B – Residential (Sand) (mg/kg)[1]		
	0m to <1m	1m to <2m	2m to <4m
Benzene	0.5	0.5	0.5
Toluene	160	220	310
Ethylbenzene	55	NL	NL
Xylenes	40	60	95

Chemical	HSL B – Residential (Sand) (mg/kg)[1]		
	0m to <1m	1m to <2m	2m to <4m
Naphthalene	3	9	NL
F1 (TPH C_6-C_{10} – BTEX)	45	70	110
F2 (TPH >C_{10}-C_{16} – Naphthalene)	110	240	440

NL: non-limiting (i.e. contaminant is not considered to pose a risk to human health through vapour inhalation regardless of concentration).
Soil type is assumed to be sandy soils based on site assessment works.
1. *Table 1A(3) – Soil Health Screening Levels for Vapour Intrusion (NEPC, 2013);*
2. *Table A4 - Soil Health Screening levels for Direct Contact for commercial/ industrial (CRC CARE, 2011);*
3. *Table A3 – Soil Health Screening Levels for Vapour Intrusion (Intrusive Maintenance Worker) (CRC CARE, 2011).*

5.4. Waste Classification Criteria

Threshold concentrations listed in Tables 1 and 2 in NSW EPA (2014) Waste Classification Guidelines: Part 1 Classifying Waste are considered appropriate for waste classification of soils which exceed the adopted assessment criteria.

5.5. Analytical Laboratories

Samples were forwarded to NATA accredited laboratories ALS Environmental, Springvale VIC (Primary Laboratory) and Envirolab (Secondary Laboratory) for the analysis requested. A total of eleven (11) primary samples were collected along with one duplicate and one triplicate sample collected for field quality assurance / quality control (QA/QC) purposes.

Samples were accompanied by Chain of Custody documentation, received and acknowledged by the laboratories. Soil samples were dispatched on ice and received by the laboratory within recommended holding times.

6. Quality Assurance/ Quality Control

The following QA/QC assessment addresses data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations and the processes for assessment of data quality provided in Section 19 (Appendix C) of Schedule B2 of the ASC NEPM - Guideline on Site Characterisation.

6.1. Data Quality Indicators

The data quality indicators (DQI) are based on the analysis of field and laboratory quality control sample results, and in accordance with AS 4482.1-2005. Specific data quality indicators for field and laboratory QA/QC samples are listed in Table 6-1.

Table 6-1**:** QA/QC Indicators

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
Completeness	Critical locations sampled	Samples collected from planned locations with no deviation from the sampling plan, without reasonable justification.	Critical samples analysed according to sampling plan.	Samples were analysed for COPCs (TRH, BTEX, PAH, heavy metals and asbestos).
	Sample collection	Samples collected in accordance with Coffey's SOPs during the assessment.	Identified COPCs were included in analysis.	As above.
	Standard Operating Procedures (SOPs) appropriate and complied with	No departure from Coffey's SOPs without reasonable justification.	Appropriate methods and LORs	Samples were analysed by laboratories NATA accredited, for the analyses to be performed and appropriate methods were used. LORs were less than assessment criteria.
	Experienced sampler	Experienced Coffey Environmental Scientists conducted the sampling.	Sample documentation complete	Chain of custody's (COCs) were returned, signed and dated by laboratory. NATA endorsed laboratory certificates were completed in accordance with Schedule B3 of the ASC NEPM. Field logs were in accordance with Coffey SOPs.

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
	Documentation correct	Samples were handled and transported under appropriate chain of custody (COC) documentation. Coffey kept original COC documentation. Sample Receipt Notifications (SRN) from the laboratory were reviewed to assess that samples were received cool and in good condition. Current calibration certificates for the PID are provided and the PID instrument was bump tested on a daily basis.	Sample holding times were complied with	Samples were analysed within holding times specified in Schedule B3 of the ASC NEPM.

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
Comparability	Same SOPs used on each occasion	Coffey SOPs were implemented.	Same sample analytical methods used.	The same laboratories and test methods were used for analysis. The primary and/or secondary laboratory was selected so that differences in preparation and/or analytical methods did not adversely affect comparability of results.
	Experienced sampler	Experienced Coffey Environmental Scientists will conduct the sampling.	Same sample LORs	As above
	Climatic conditions (temperature, rainfall, wind etc.)	Sampling for this work was completed when necessary. Climatic conditions did not cause issues for comparability of data.	Same laboratories	As above
	Same types of samples collected	Samples were collected in the appropriate laboratory supplied container specific to the analyses performed.	Same units	As above

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
Representativeness	Appropriate media sampled according to sample plan	Soil samples were collected and analysed in accordance with Coffey's SOPs.	Appropriate media sampled according to sample plan	Collected samples were analysed by NATA accredited laboratories.
	Appropriate media identified in sample plan	Soil collected and analysed in accordance with Coffey's SOPs.		
	SOPs appropriate and complied	Coffey's SOPs were implemented. Site observations, PID readings and analytical results confirmed that volatiles were not a chemical of concern.	Analysis of field duplicates	Laboratory duplicates were analysed in general accordance with ASC NEPM.

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
Precision	SOPs appropriate and complied with	Coffey SOPs were implemented.	Analysis of laboratory duplicates	RPD values for inter-laboratory duplicates and recovery of matrix spikes were acceptable.
	Analysis of field duplicates	As for laboratory considerations	Analysis of field duplicates	Duplicates were analysed at a frequency of greater than: • 5% intra laboratory duplicates; • 5% inter laboratory duplicates. RPDs were calculated and compared to relevant acceptance criteria. 30% for concentrations more than 10 times the LOR and 50% for concentrations less than 10 times the LOR (Standards Australia 1997)
DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
Accuracy	SOP appropriate and complied with	Coffey SOPs were implemented		

DQI	Field Considerations	DQI Criteria	Laboratory Considerations	DQI Criteria
			Laboratory duplicate and Matrix spike	RPD values for laboratory control duplicates and recovery of matrix spikes are within acceptance limits. Where RPDs and matrix spikes do not meet acceptance limits, justification for the use of such data will be required or additional analysis may need to be considered.

6.2. Field Quality Assurance/ Quality Control

QA/QC procedures implemented for this project included:

- Sampling performed by qualified Coffey environmental professionals in accordance with Coffey's SOPs which are based on industry accepted protocols for environmental sampling and are consistent with Schedule B2 of the ASC NEPM;
- The following intra-laboratory (duplicate) and inter-laboratory (triplicate) samples were collected and submitted for laboratory analysis as listed in Table 6-2.

Table 6-2: Summary of Duplicate Samples

Sample Date	Primary Sample	Sample Matrix	Field Duplicate	Field Triplicate
5/06/2019	BH04_0.15-0.3	Soil	QC1	QC2

In summary, the number of intra and inter-laboratory duplicate samples equate to 9% of primary samples, achieving the target of 5% for intra and inter-laboratory samples.

Calculated RPD values from collected primary, intra and inter-laboratory duplicate QC samples and are listed in Table LR3 of Appendix C.

A review of soil QA/QC results generally reported RPDs below the control limits except for chromium, lead and zinc, which were above the adopted RPD acceptance limits.

These RPD exceedances are characteristic of localised heterogeneity of fill material as observed during field work. Coffey notes that the samples collected from filling material, containing sandy gravels with cobbles and fine to coarse grained sands. The discrepancy in concentrations, particularly heavy metals, is likely to be associated with the following:

- Differing abundances of coarse fractions; and
- Variability in composition of the primary and QC samples collected in the field and potentially in the laboratory sub-samples taken from field samples for analysis could also contribute to the variation in RPD.

6.3. Laboratory QA/ QC

In accordance with NATA endorsed quality plans, the project laboratories performed internal QA/QC assessment which included laboratory duplicates, method blanks, matrix spikes and surrogate spikes.

Laboratory QC analytical results are summarised below:

- Analysis of samples was undertaken by NATA accredited environmental laboratories;
- Samples were extracted and analysed within acceptable holding times, with the exception of pH in sample BH01_0.2-0.3 which was 1 day overdue;
- No target analytes were detected in the method blanks;
- RPDs for the laboratory duplicate samples were within the acceptable range, with the exception of phenanthrene. Details of the RPD exceedances are provided in Appendix C;
- Percentage recovery results for laboratory control samples were within the acceptable range, with the exception of exchangeable magnesium. Details of the control limit exceedance are provided in Appendix C;
- Percentage recovery results for surrogate samples were within the acceptable range; and
- Percentage recovery results for matrix spikes were within the acceptable range.

6.4. Data Quality Assessment

Coffey considers that the data presented is usable and representative of the sampling locations at the time of sampling. DQI's (completeness, comparability, representativeness, precision and accuracy) were complied with and completed consistently during the assessment, with the exception of field duplicates. While RPDs were outside acceptance limits, Coffey consider that the field and laboratory data assessed is reliable with consideration to the following:

- Critical sample locations sampled;
- Each sample was collected;
- SOP's appropriate and complied with;
- Fieldworks and sampling completed by a suitably qualified Environmental Scientist;
- Sampling procedures were appropriate, complied with and completed consistently during the assessment works, with exception of collection of disturbed samples directly from the auger causing a potential loss in volatiles (PID readings and analytical results confirmed that volatiles were not detected in the soils samples);
- Sampling completed in optimal weather;
- The laboratory analysed samples as per the CoC;
- Sample documentation was completed;
- Appropriate laboratory testing methods and LORs were implemented;
- The laboratory undertook the analysis of laboratory prepared duplicates; and
- Laboratory QA/QC procedure implemented and considered appropriate.

Therefore, based on the above discussion, the data assessed comprising field and laboratory influences on results, as part of quality assurance, are considered to be accurate, reliable and suitable for the purpose of this assessment.

7. Results

7.1. Site Specific Geology

The site is overlayed by fill material to depths ranging from 0.4m to 2.8m below ground level (bgs) in the carpark level situated to the north and rear of the NBN building, respectively (PSI and DSI observations). The fill is underlain by residual soils comprising clay materials grading into extremely weathered rock. It is noted the boreholes were carried out in accessible areas only which comprise the current carpark or paved areas.

The borehole location plan is provided as Appendix A, Figure 2 and borehole logs from the site investigation, are provided in Appendix I. The interpreted geotechnical units encountered at the site are shown in Table 7-1.

Table 7-1 - Summary of generalised ground model (inputs from PSI and DSI)

Unit	Material / Origin	Description
1a	Fill	Wearing Course: bitumen spray seal/s, up to 20mm thick varying within the site
1b	Fill	Sandy CLAY: low to medium plasticity, grey, dark brown, fine grained sand, with fine angular to sub-angular gravel Sandy GRAVEL: fine to coarse grained, sub-angular to angular, grey, with fine grained sand Clayey SAND: fine to coarse grained, brown and red Sandy CLAY: low to medium plasticity, dark brown, dark grey, mottled orange, fine grained sand, with fine, sub-angular to sub-rounded gravel and glass pieces
2a	Residual Soil	Sandy CLAY: low to medium plasticity, dark brown and dark grey, mottled red, fine to coarse grained sand CLAY: low to medium plasticity, grey to pale grey, orange laminations, mottled orange, red and brown, with fine grained sand and gravel Gravelly CLAY: low to medium plasticity, pale grey and grey, fine grained, rounded to sub-rounded gravel, trace of fine to coarse grained sand
2b	Extremely weathered rock	Sandy CLAY: low plasticity, orange, mottled pale brown, fine grained sand SANDSTONE: fine grained, pale grey and orange
3a	Distinctly to slightly weathered rock	SANDSTONE: fine to medium grained, brown/orange and grey, with siltstone bands and black carbonaceous laminations, distinctly to slightly weathered, low to medium strength
3b	Coal Seam	COAL: black, crushed seams, extremely weathered to highly weathered, very low to low strength, cleated
3c	Slightly weathered to fresh rock	SANDSTONE: fine to medium grained, grey to brown, with black carbonaceous veneer, moderately to slightly weathered, low to medium strength

Unit	Material / Origin	Description
3d	Moderately to slightly weathered rock	SILTSTONE: grey to dark grey, with some sandstone bands, slightly weathered to fresh, low to medium strength
3e	Coal Seam	COAL: black, crushed seams, extremely weathered to highly weathered, very low to low strength, cleated
3f	Moderately to slightly weathered rock	SILTSTONE: grey to dark grey, with some sandstone bands, slightly weathered to fresh, low to medium strength
3g	Slightly weathered to fresh rock	SANDSTONE: fine to medium grained, grey to brown, with black carbonaceous veneer, moderately to slightly weathered, low to medium strength

7.2. Field Screening Results

Soil samples were screened for presence of volatile petroleum hydrocarbons using a photoionisation detector (PID). The PID readings were reported between 0.0 ppm and 0.4 ppm, indicating that volatile petroleum hydrocarbons were unlikely to be present at reportable concentrations at the sample locations.

Individual PID readings are reported on the borehole log sheets presented in Appendix B.

7.3. Soil Results

Soil analytical results from BH01 – BH07 were compared to the site criteria and waste classification criteria provided in Tables LR1 and LR2 of Appendix C respectively. Copies of the NATA endorsed laboratory reports are provided in Appendix D. Sampling locations are shown in Figure 2. The soil results have been combined with the results of four (4) samples previously undertaken during the Coffey (2018) PSI (identified as BH01, BH02, BH03 and BH04 under the PSI data column).

7.3.1. Health Based Investigation and Screening Levels (Soil)

A comparison of the combined (Coffey PSI and DSI) analytical results against health-based investigation and screening levels reported no exceedances of the adopted Site Assessment Criteria (SAC).

A summary of the analytical results is provided in Appendix C, Table LR1.

7.3.2. Preliminary in Situ Waste Classification

A preliminary in situ waste classification was made using analytical results for soil and comparing to the NSW EPA Waste Classification Guidelines (2014) with the following findings:

- There was one exceedance of the Benzo(a)Pyrene CT1 guideline value measured in BH02_0.1-0.25 (0.9mg/kg versus guideline value of 0.8mg.kg). A 95%UCL calculation was completed for the primary samples (11) with a resulting 95%UCL concentration of 0.634 mg/kg.

Based on a comparison of the combined results of both the PSI and DSI to the waste classification guidelines, fill soils have a preliminary waste classification of **General Solid Waste CT1**. The existing asphalt pavement pre-classifies as **General Solid Waste (non-putrescible)** under the Waste classification Guidelines. Should the asphalt pavement be required for reuse it can be recovered under the NSW EPA Reclaimed Asphalt Pavement Order 2014. Under this Order, the asphalt pavement must be tested for coal tar (including a phenol test) and asbestos.

Coffey notes that the in-situ waste classification is preliminary only. Excavations during redevelopment works may reveal soil conditions that differ from those encountered during the in-situ assessment, which may require further assessment prior to offsite disposal. An unexpected finds protocol should be implemented during excavation works at the site as per Section 9.

Analytical results tables for the waste classification summary above are provided in Appendix C, Table LR2.

8. Discussion

8.1. Conceptual site model

Based on the results of this DSI, the preliminary conceptual site model (pCSM) has been updated with areas of environmental concern and associated contamination risk summarised in Table 8-1.

Table 8-1 - Areas and Chemicals of Environmental Concern

AEC	Potentially Contaminating Activity	Potential COCs	Likelihood of Contamination*	Comments
1 (Entire Site)	Extent and quality of fill (beneath and around existing buildings)	Heavy Metals, TPH, BTEX, PAH, Asbestos	Low	Based on site photographs from the 1950's the main building and subsequent additions were constructed in a cut made in the natural rock. As a result, the likelihood of contaminated fill being present beneath the site is low. Should fill be present it should be of similar type to that found and sampled in other locations on site.
2 Access road and parking pavements	Coal tar and slag used in pavement construction pre 1980s	Heavy Metals, TPH, BTEX, PAH, Asbestos	Low	The fill beneath the roadways have mainly been found to be comprised of sandy gravel and cobbles with minimal slag identified across the site. The concentrations of COPC in the fill were found to be below the relevant site assessment criteria.

*Notes: * = This is a qualitative assessment of the probability of contamination being detected at the potential AEC.*
Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc; BTEX - Benzene, Toluene, Ethylbenzene and Xylenes; TRH - Total Recoverable Hydrocarbons; PAH - Polycyclic Aromatic Hydrocarbons; OCP - Organochlorine Pesticides; OPP - Organophosphorus Pesticides; PCB - Polychlorinated Biphenyls; VOC - Volatile Organic Compounds; SVOC - Semi-Volatile Organic Compounds

8.2. Land Use Suitability

The results of the DSI indicate that the fill is mainly confined to the upper 1m of the surface soil across the site, with some deeper pockets identified in the western carpark (DSI: BH01 to 1.5m BGL) and the south eastern corner (DSI: BH07 to 1.6m BGL; PSI BH04 to 2.8m BGL). Residual material is also relatively shallow (i.e. less than 1m below ground surface across most of the site).

For the purposes of the proposed development the adopted SAC is HIL B residential with minimal access to soils. There were no exceedances of the adopted SAC identified in the samples analysed during both the PSI and DSI.

8.3. Preliminary in Situ Waste Classification

According to the procedure outlined in the NSW EPA Waste Classification Guidelines (2014), the following is assessed for the fill materials assessed.

- The material is not a Special Waste:
- The material is not a Liquid Waste;
- The material is not a Pre-classified Waste; and

- The material does not possess hazardous characteristics.

Therefore, the fill material is classified as **General Solid Waste (CT1).** If these soils are to be disposed offsite, they are required to be disposed to a facility licensed to accept General Solid Waste (CT1). The existing asphalt pavement pre-classifies as **General Solid Waste (non-putrescible)** under the Waste classification Guidelines. Should the asphalt pavement be required for reuse it can be recovered under the NSW EPA Reclaimed Asphalt Pavement Order 2014. Under this Order, the asphalt pavement must be tested for coal tar (including a phenol test) and asbestos.

9. Conclusions and recommendations

The site is currently occupied by the NBN Television broadcast facility constructed during the 1960's (1961-1962). A review of available information indicates the site was vacant land until the commencement of construction in 1961. An examination of historical, near ground level photographs (source: Newcastle Lost Facebook Group 2018 – Photo Credit Unknown) showing the construction of the NBN TV facility confirms that the building was erected in a significantly cut portion of the hill (cut specifically for construction).

The site use has not changed since the 1960s and the number of buildings on site and their respective sizes, has progressively increased. Retaining walls were also constructed through the years along with the addition of significant areas of concrete pavement and bitumen roads.

As a result of the elevation profile across the site (elevation changes from approximately 36m to 52m AHD from Mosbri Crescent moving due east), fill depth is variable, although typically quite shallow (i.e. < 1.0m bgs). It was observed that in BH04 (PSI) and BH07 (DSI) the fill depth was deeper (1.6 - 2.8m thick) given the fill used during retaining wall construction on the eastern side (rear) of the property.

A total of eleven (11) primary locations have been sampled across both preliminary and detailed site investigations with the fill showing little evidence of chemical contamination, i.e. COPC tested resulted in concentrations below the investigation levels for the assessment. There was some evidence of uncontrolled fill (building rubble including bricks, steel, concrete blocks etc.) at BH04 during the PSI with bricks, slag and rebar observed at BH07 (which is in close proximity to BH04) during this DSI. Samples collected from both locations showed little evidence of chemical contamination with the COPC assessed below the SAC.

Based on the findings of this assessment it is considered that the Site is suitable for the proposed land use scenario of residential with minimal access to soil.

The following are recommended prior to the commencement of demolition works:

- **Review of the Hazardous Materials Register** – Any existing Hazardous Materials Register (s) should be reviewed for currency and an assessment made as to whether the Register is suitable to provide WHS guidance during demolition of building structures.
- **Hazardous Materials Survey** – Should a current Hazardous Materials Register not be available, it is recommended that a Hazardous Materials Survey be carried out on the main building and ancillary structures prior to demolition works. An up-to-date Hazardous Materials Register must be prepared following the completion of the Survey.
- **Construction Environmental Management Plan –** A Construction Environmental Management Plan (CEMP) must be prepared by the construction contractor and implemented prior to the commencement of bulk earthworks.
- **Unexpected Finds Protocol –** An unexpected finds protocol must be included as part of the CEMP or as a stand-alone document in order to manage potentially contaminated fill material that may be encountered during the civil construction phase.

10. Limitations

Information is not readily available on the early history (pre-1954) of the site and therefore, some site activities may not have been identified. Aerial photographs are up to 12 years apart and other site history information available prior to 1954 is sparse. We cannot preclude that potentially contaminating activities took place during these periods. Allowances for uncertainties and potential unexpected finds should be made during planning and development phases.

It is the nature of contaminated site investigations that the degree of variability in site conditions cannot be known completely and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site. Professional judgement must be exercised in the collection and interpretation of the data.

In preparing this report, current guidelines for assessment and management of contaminated land were followed. This work has been conducted in good faith in accordance with Coffey understanding of the client's brief and general accepted practice for environmental consulting.

This report was prepared for Crescent Newcastle Pty Ltd. to provide a preliminary assessment of land contamination at the subject site. No warranty, expressed or implied, is made as to the information and professional advice included in this report. Anyone using this document does so at their own risk and should satisfy themselves concerning its applicability and, where necessary, should seek expert advice in relation to the particular situation. Any use of information in this report must consider the uncertainties outlined in *Important Information about your Coffey Environmental Report*, which follows this text.

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Appendix A – Figures

100 0 100 200 300 400

Scale (metres) 1:8000

IMAGERY SOURCE: WORLD STREET MAP
SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

drawn	SR / AW
approved	-
date	13/06/2019
scale	AS SHOWN
original size	A4

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A TETRA TECH COMPANY

client: CRESCENT NEWCASTLE PTY LTD

project: PROPOSED RESIDENTIAL DEVELOPMENT
PRELIMINARY CONTAMINATION ASSESSMENT
11-17 MOSBRI CRESCENT, THE HILL, NSW

title: SITE LOCATION PLAN

project no: 754-NTLGE220504-AJ | figure no: FIGURE 1 | rev: A

PLOT DATE: 13/06/2019 8:50:19 AM DWG FILE: F:\1. PROJECTS\4. SYD-GEOTECHNICS\OTHER OFFICES\NTL-GE\NTLGE220504\CAD\754-NTLGE220504-AJ.DWG

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

10 0 10 30 50

Scale (metres) 1:1000

drawn	SR / AW
approved	-
date	13/06/2019
scale	AS SHOWN
original size	A3

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A TETRA TECH COMPANY

client: CRESCENT NEWCASTLE PTY LTD

project: PROPOSED RESIDENTIAL DEVELOPMENT
PRELIMINARY CONTAMINATION ASSESSMENT
11-17 MOSBRI CRESCENT, THE HILL, NSW

title: BOREHOLE LOCATION PLAN

project no: 754-NTLGE220504-AJ | figure no: FIGURE 2 | rev: A

PLOT DATE: 13/06/2019 8:51:02 AM DWG FILE: F:\1. PROJECTS\4. SYD-GEOTECH\NICS\OTHER OFFICES\NTL-GENTLGE220504\CAD\754-NTLGE220504-AJ.DWG

Appendix B – Borehole Logs

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Engineering Log - Borehole

Borehole ID.	**BH01**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385617; N: 6355653 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		Not Encountered	E		0.0		GP	**FILL**: fine to coarse grained, black.	D			**FILL - WEARING COURSE**
								FILL: Sandy GRAVEL with Cobbles: fine to coarse grained, to 100 mm.	W			**FILL - PAVEMENT**
			E									PID: 0 ppm
							CL-CH	**FILL: Sandy CLAY**: fine to medium grained, medium to high plasticity, brown, grey, trace amounts of black fine chitter.				**FILL**
					0.5							
			E									PID: 0.2 ppm
					1.0							
			E									PID: 0.4 ppm
								Brick fragments @ 1.3mbgs				
					1.5							
							CL-CH	**Sandy CLAY**: fine to medium grained, medium to high plasticity, brown, grey, trace red-brown.				**RESIDUAL SOIL**
					2.0			Borehole BH01 terminated at 2.0 m Target depth				
					2.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF BOREHOLE: NON CORED NTLEN220504.GPJ <<DrawingFile>> 11-06-2019 12:15

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration 1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH02**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
date started:	**05 Jun 2019**
date completed:	**05 Jun 2019**
logged by:	**SR**
checked by:	

client: **STRONACH PROPERTIES PTY LTD**

principal:

project: **DETAILED SITE INVESTIGATION**

location: **11-17 MOSBRI CRESCENT, THE HILL 2300**

position: E: 385653; N: 6355690 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) (100 200 300 400)	structure and additional observations
NDD		Not Encountered						**FILL**: fine to coarse grained, black, grey.	D			**FILL - WEARING COURSE**
			E				GP	**FILL: GRAVEL with Cobbles**: fine to coarse grained, black, grey, some slag skulls present.	W			**FILL - PAVEMENT** PID: 0.1 ppm
							CI-CH	**CLAY**: medium to high plasticity, white.				**RESIDUAL SOIL/ EXTREMELY WEATHERED ROCK**
								SANDSTONE: fine to medium grained, orange-brown.				
					0.5			Borehole BH02 terminated at 0.4 m Target stratum				
					1.0							
					1.5							
					2.0							
					2.5							

CDF_0_9_06_LIBRARY.GLB rev:AR Log COF BOREHOLE: NON CORED NTLEN220504.GPJ <<DrawingFile>> 11-06-2019 12:15

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3) — no resistance ranging to refusal

water — 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey
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Engineering Log - Borehole

Borehole ID.	**BH03**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385683; N: 6355679 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		Not Encountered	E					**FILL**: fine to coarse grained, black, grey.	D			**FILL - WEARING COURSE**
							GP-GC	**FILL: Gravelly CLAY with Cobbles**: fine to coarse grained, medium plasticity, brown.	W			**FILL - PAVEMENT** PID: 0.1 ppm
			E				CI-CH	**CLAY**: medium to high plasticity, white.				**RESIDUAL SOIL/ EXTREMELY WEATHERED ROCK**
								SANDSTONE: fine to medium grained, orange-brown.				PID: 0.4 ppm
					0.5			Borehole BH03 terminated at 0.4 m Target stratum				
					1.0							
					1.5							
					2.0							
					2.5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH04**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385689; N: 6355571 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		05-06-19	E					**FILL**: fine to coarse grained, black, grey.	D			**FILL - WEARING COURSE**
			E				GP	**FILL: Sandy GRAVEL with Cobbles**: fine to coarse grained, orange-brown/ pale-brown.	W			**FILL - PAVEMENT** PID: 0.3 ppm
					0.5		CI	**FILL: CLAY**: medium plasticity, pale-brown, traces of gravel.				**FILL**
			E					tree root @ 0.9mbgs				PID: 0.1 ppm
					1.0		CI-CH	**CLAY**: medium to high plasticity, white/ pale-brown.				**RESIDUAL SOIL**
								SANDSTONE: fine to medium grained, orange-brown.				**EXTREMELY WEATHERED ROCK**
					1.5			Borehole BH04 terminated at 1.2 m Target stratum				
					2.0							
					2.5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH05**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385678; N: 6355574 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		Not Encountered	E					**FILL**: fine to coarse grained, black, grey.	D			**FILL - WEARING COURSE**
							GP	**FILL: Sandy GRAVEL with Cobbles**: fine to coarse grained.	W			**FILL - PAVEMENT** PID: 0.3 ppm
			E		0.5		CL-CH	**FILL: CLAY**: medium to high plasticity, brown, some orange-brown.				**FILL** PID: 0.1 ppm
			E		1.0		CI-CH	**CLAY**: medium to high plasticity, grey, brown, traces mottled red-orange.				**RESIDUAL SOIL** PID: 0 ppm
								Borehole BH05 terminated at 1.0 m Target stratum				

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration 1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH06**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385684; N: 6355564 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		Not Encountered			0.0			**FILL**: fine to coarse grained, black, grey.	D			**FILL - WEARING COURSE**
			E				GP	**FILL: Sandy Gravelly COBBLES**: fine to coarse grained, to 200 mm, sub-rounded to angular, black, grey, brown. concrete obstruction @ 0.3mbgs glass and brick fragments in side of borehole	W			**FILL** PID: 0.2 ppm
			E		0.5			large cobbles approx. 200mm in diameter				PID: 0.3 ppm
			E		1.0		GP	**FILL: Sandy GRAVEL with Cobbles**: fine to coarse grained, to 200 mm, sub-rounded to angular, brown, grey, black.				PID: 0.3 ppm
					1.5							
					2.0			Borehole BH06 terminated at 2.0 m Target depth				
					2.5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH07**
sheet:	1 of 1
project no.	**754-NTLGE220504-AJ**
client:	**STRONACH PROPERTIES PTY LTD**
date started:	**05 Jun 2019**
principal:	
date completed:	**05 Jun 2019**
project:	**DETAILED SITE INVESTIGATION**
logged by:	**SR**
location:	**11-17 MOSBRI CRESCENT, THE HILL 2300**
checked by:	

position: E: 385679; N: 6355558 (MGA94 Zone 56) | surface elevation: Not Specified | angle from horizontal: 90°

drill model: NDD | drilling fluid: NDD | hole diameter : 500 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
NDD		Not Encountered	E		0.5		GP	**FILL**: fine to coarse grained, black.	D			**FILL - WEARING COURSE**
							GP	**FILL: Sandy GRAVEL**: fine to coarse grained, orange-brown.	W			**FILL - PAVEMENT**
								FILL: Sandy Gravelly COBBLES: fine to coarse grained, black, grey, slag skulls.				**FILL** PID: 0 ppm
			E		1.0		SP	**FILL: Gravelly SAND with Cobbles**: fine to coarse grained, to 150 mm, grey, brick fragments, large cobbles. Brick fragments between 0.9-1.4mbgs Piece of reo-bar @1.1mbgs				PID: 0.1 ppm
			E		1.5							PID: 0.3 ppm
							CH	**CLAY**: high plasticity, pale-brown, brown.				**RESIDUAL SOIL**
					2.0			Borehole BH07 terminated at 2.0 m Target depth				
					2.5							

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method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- NDD non destructive drilling

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration 1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix C – Analytical Data

Table LR1
Health Investigation Screening Levels
NBN - DSI
754-NTLGE220504-AJ

							Field_ID	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25	BH03_0.2-0.25	BH04_0.15-0.3	BH05_0.2-0.3
							Sampled_Date-Time	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19
							Matrix_Description	Soil	Soil	Soil	Soil	Soil	Soil
				NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 2m to <4m, Sand						
Method_Type	**ChemName**	**Units**	**EQL**										
Asbestos Identification in Soils	APPROVED IDENTIFIER:	--						1	1	1	1	1	1
	Asbestos (Trace)	Fibres	5					0	0	0	0	0	0
	Asbestos Type	-						1	1	1	1	1	1
	Description	--						1	1	1	1	1	1
	Organic Fibre	g/kg	0.1					0	0	0	0	0	0
	Synthetic Mineral Fibre	g/kg	0.1					0	0	0	0	0	0
Moisture Content	Moisture Content	%	1					16.8	15.6	21.9	18.4	9.7	10.1
Organic Matter	Organic Matter	%	0.5					0.6	-	-	-	-	-
PAH/Phenols (SIM)	Acenaphthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(a)anthracene	mg/kg	0.5					<0.5	<0.5	0.7	<0.5	<0.5	<0.5
	Benzo(a)pyrene	mg/kg	0.5					<0.5	<0.5	0.9	<0.5	<0.5	<0.5
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	4				0.6	0.6	1.4	0.6	0.6	0.6
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5					1.2	1.2	1.7	1.2	1.2	1.2
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5					<0.5	<0.5	1.2	<0.5	<0.5	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5					<0.5	<0.5	1	<0.5	<0.5	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Chrysene	mg/kg	0.5					<0.5	<0.5	0.7	<0.5	<0.5	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5					<0.5	<0.5	1.2	<0.5	<0.5	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5					0.8	<0.5	1.2	<0.5	<0.5	<0.5
	Fluorene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5					<0.5	<0.5	0.7	<0.5	<0.5	<0.5
	Naphthalene	mg/kg	0.5		3			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Phenanthrene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Pyrene	mg/kg	0.5					0.8	<0.5	1.1	<0.5	<0.5	<0.5
	Total PAHs	mg/kg	0.5	400				1.6	<0.5	7.5	<0.5	<0.5	<0.5
pH (1:5)	pH (Lab)	pH_Units	0.1					8.8	-	-	-	-	-
pH in soil using a 0.01M CaCl2 extract	pH (CaCl2)	pH Unit	0.1					8	-	-	-	-	-
Total Mercury by FIMS	Mercury	mg/kg	0.1	120				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Metals by ICP-AES	Arsenic	mg/kg	5	500				6	6	7	8	<5	7
	Cadmium	mg/kg	1	150				<1	<1	<1	<1	<1	<1
	Chromium	mg/kg	2	500				9	9	10	11	12	11
	Copper	mg/kg	5	30000				17	14	8	17	14	18
	Lead	mg/kg	5	1200				86	47	6	21	7	26
	Nickel	mg/kg	2	1200				3	2	2	7	8	11
	Zinc	mg/kg	5	60000				94	38	12	32	41	46
TRH - Semivolatile Fraction	F2-NAPHTHALENE	mg/kg	50		110	240	440	<50	<50	<50	<50	<50	<50
	C10 - C14	mg/kg	50					<50	<50	<50	<50	<50	<50
	C15 - C28	mg/kg	100					<100	<100	<100	<100	<100	<100
	C29 - C36	mg/kg	100					<100	<100	<100	<100	<100	<100
	C10 - C36 (Sum of total)	mg/kg	50					<50	<50	<50	<50	<50	<50
	C10 - C40 (Sum of total)	mg/kg	50					<50	<50	<50	<50	<50	<50
	C10-C16	mg/kg	50					<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100					<100	<100	<100	<100	<100	<100
	C34-C40	mg/kg	100					<100	<100	<100	<100	<100	<100
TRH Volatiles/BTEX	Benzene	mg/kg	0.2		0.5	0.5	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	mg/kg	0.5		55			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Naphthalene	mg/kg	1		3			<1	<1	<1	<1	<1	<1
	Toluene	mg/kg	0.5		160	220	310	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	C6 - C9	mg/kg	10					<10	<10	<10	<10	<10	<10
	Total BTEX	mg/kg	0.2					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (m & p)	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene (o)	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Xylene Total	mg/kg	0.5		40	60	95	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	C6-C10 less BTEX (F1)	mg/kg	10		45	70	110	<10	<10	<10	<10	<10	<10
	C6 - C10	mg/kg	10					<10	<10	<10	<10	<10	<10

Result	Exceeds ASC NEPM 2013 Health Investigation Levels - Residential (HIL B)
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 0 to <1m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 1 to <2m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 2 to <4m, Sand

Table LR1
Health Investigation Screening Levels
NBN - DSI
754-NTLGE220504-AJ

Method_Type	ChemName	Units	EQL	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 2m to <4m, Sand	Field_ID	BH05_0.4-0.6	BH06_0.2-0.3	BH06_0.7-0.9	BH07_0.2-0.3	BH07_0.9-1.0	BH01 0.5	BH01 1.0	BH02 0.1	BH02 0.5	BH03 0.4M	H03 0.7-1.0	BH04 0.5
								Sampled_Date-Time	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	03-Sep-18	03-Sep-18	10-Sep-18	10-Sep-18	17-Sep-18	17-Sep-18	12-Sep-18
								Matrix_Description	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Asbestos Identification in Soils	APPROVED IDENTIFIER:	--							1	1	1	1	1							
	Asbestos (Trace)	Fibres	5						0	0	0	0	0							
	Asbestos Type	-							1	1	1	1	1							
	Description	--							1	1	1	1	1							
	Organic Fibre	g/kg	0.1						0	0	0	0	0							
	Synthetic Mineral Fibre	g/kg	0.1						0	0	0	0	0							
Moisture Content	Moisture Content	%	1						30	1.7	16.9	9.8	9.9	16	18	8.1	19	18	18	11
Organic Matter	Organic Matter	%	0.5						-	3.6	-	-	-							
PAH/Phenols (SIM)	Acenaphthene	mg/kg	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	mg/kg	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	mg/kg	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)anthracene	mg/kg	0.5						<0.5	<0.5	<0.5	0.5	0.7	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	1.3
	Benzo(a)pyrene	mg/kg	0.5						<0.5	<0.5	<0.5	0.6	0.7	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	1.4
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	4					0.6	0.6	0.6	1	1.1	0.6	1.4	0.6	0.6	0.6	0.6	2.1
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5						1.2	1.2	1.2	1.3	1.4	1.2	1.7	1.2	1.2	1.2	1.2	2.3
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5						<0.5	<0.5	<0.5	0.7	0.8	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	1.8
	Benzo(g,h,i)perylene	mg/kg	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
	Benzo(k)fluoranthene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	1
	Chrysene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	1.2
	Benzo[b+j]fluoranthene	mg/kg	0.5						<0.5	<0.5	<0.5	0.6	0.7	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	1
	Dibenz(a,h)anthracene	mg/kg	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	mg/kg	0.5						<0.5	<0.5	0.9	1.8	2.1	0.7	1.9	<0.5	<0.5	<0.5	<0.5	3.3
	Fluorene	mg/kg	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	mg/kg	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
	Naphthalene	mg/kg	0.5		3				<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	mg/kg	0.5						<0.5	<0.5	<0.5	1.1	1	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	1.6
	Pyrene	mg/kg	0.5						<0.5	<0.5	0.9	1.6	1.8	0.6	1.5	<0.5	<0.5	<0.5	<0.5	2.8
	Total PAHs	mg/kg	0.5	400					<0.5	<0.5	1.8	6.2	7.6	1.3	8.9	<0.5	<0.5	<0.5	<0.5	15.6
pH (1:5)	pH (Lab)	pH_Units	0.1						-	9.2	-	-	-							
pH in soil using a 0.01M CaCl2 extract	pH (CaCl2)	pH Unit	0.1						-	8.2	-	-	-							
Total Mercury by FIMS	Mercury	mg/kg	0.1	120					<0.1	<0.1	<0.1	0.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Metals by ICP-AES	Arsenic	mg/kg	5	500					5	<5	<5	6	<5	12	8.6	6.1	10	3.4	7.6	4.8
	Cadmium	mg/kg	1	150					<1	<1	<1	<1	<1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
	Chromium	mg/kg	2	500					6	142	10	51	3	13	14	16	12	6.3	20	13
	Copper	mg/kg	5	30000					6	<5	14	11	6	16	18	13	16	6	9.8	11
	Lead	mg/kg	5	1200					18	<5	42	92	100	57	66	23	29	8	23	56
	Nickel	mg/kg	2	1200					<2	<2	3	4	<2	<5	<5	5.1	<5	<5	<5	<5
	Zinc	mg/kg	5	60000					11	<5	25	89	76	52	79	59	27	11	22	67
TRH - Semivolatile Fraction	F2-NAPHTHALENE	mg/kg	50		110	240	440		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C10 - C14	mg/kg	50						<50	<50	<50	<50	<50	<20	<20	<20	<20	<20	<20	<20
	C15 - C28	mg/kg	100						<100	<100	<100	<100	<100	<50	<50	78	<50	<50	<50	62
	C29 - C36	mg/kg	100						<100	<100	<100	<100	<100	<50	<50	690	<50	<50	<50	<50
	C10 - C36 (Sum of total)	mg/kg	50						<50	<50	<50	<50	<50	<50	<50	768	<50	<50	<50	62
	C10 - C40 (Sum of total)	mg/kg	50						<50	<50	<50	<50	<50	<100	<100	1520	<100	<100	<100	<100
	C10-C16	mg/kg	50						<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100						<100	<100	<100	<100	<100	<100	<100	520	<100	<100	<100	<100
	C34-C40	mg/kg	100						<100	<100	<100	<100	<100	<100	<100	1000	<100	<100	<100	<100
TRH Volatiles/BTEX	Benzene	mg/kg	0.2		0.5	0.5	0.5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Ethylbenzene	mg/kg	0.5		55				<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Naphthalene	mg/kg	1		3				<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Toluene	mg/kg	0.5		160	220	310		<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	C6 - C9	mg/kg	10						<10	<10	<10	<10	<10	<20	<20	<20	<20	<20	<20	<20
	Total BTEX	mg/kg	0.2						<0.2	<0.2	<0.2	<0.2	<0.2							
	Xylene (m & p)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.5		40	60	95		<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	C6-C10 less BTEX (F1)	mg/kg	10		45	70	110		<10	<10	<10	<10	<10	<20	<20	<20	<20	<20	<20	<20
	C6 - C10	mg/kg	10						<10	<10	<10	<10	<10	<20	<20	<20	<20	<20	<20	<20

Result	Exceeds ASC NEPM 2013 Health Investigation Levels - Residential (HIL B)
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 0 to <1m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 1 to <2m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 2 to <4m, Sand

Table LR1
Health Investigation Screening Levels
NBN - DSI
754-NTLGE220504-AJ

								Field_ID	BH04 1.0	BH04 3.0
								Sampled_Date-Time	12-Sep-18	12-Sep-18
								Matrix_Description	Soil	Soil
Method_Type	ChemName	Units	EQL	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 2m to <4m, Sand			
Asbestos Identification in Soils	APPROVED IDENTIFIER:	--								
	Asbestos (Trace)	Fibres	5							
	Asbestos Type	-								
	Description	--								
	Organic Fibre	g/kg	0.1							
	Synthetic Mineral Fibre	g/kg	0.1							
Moisture Content	Moisture Content	%	1						9.3	13
Organic Matter	Organic Matter	%	0.5							
PAH/Phenols (SIM)	Acenaphthene	mg/kg	0.5						<0.5	<0.5
	Acenaphthylene	mg/kg	0.5						<0.5	<0.5
	Anthracene	mg/kg	0.5						<0.5	<0.5
	Benzo(a)anthracene	mg/kg	0.5						1.1	<0.5
	Benzo(a)pyrene	mg/kg	0.5						1.2	<0.5
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	4					1.8	0.6
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5						2.1	1.2
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5						1.6	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5						0.9	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5						0.9	<0.5
	Chrysene	mg/kg	0.5						1	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5						0.9	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5						<0.5	<0.5
	Fluoranthene	mg/kg	0.5						2.8	<0.5
	Fluorene	mg/kg	0.5						<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5						0.6	<0.5
	Naphthalene	mg/kg	0.5		3				<0.5	<0.5
	Phenanthrene	mg/kg	0.5						1.3	<0.5
	Pyrene	mg/kg	0.5						2.4	<0.5
	Total PAHs	mg/kg	0.5	400					13.1	<0.5
pH (1:5)	pH (Lab)	pH_Units	0.1							
pH in soil using a 0.01M CaCl2 extract	pH (CaCl2)	pH Unit	0.1							
Total Mercury by FIMS	Mercury	mg/kg	0.1	120					<0.1	<0.1
Total Metals by ICP-AES	Arsenic	mg/kg	5	500					4.7	2
	Cadmium	mg/kg	1	150					0.5	<0.4
	Chromium	mg/kg	2	500					39	5.3
	Copper	mg/kg	5	30000					14	6.1
	Lead	mg/kg	5	1200					83	24
	Nickel	mg/kg	2	1200					<5	<5
	Zinc	mg/kg	5	60000					230	33
TRH - Semivolatile Fraction	F2-NAPHTHALENE	mg/kg	50		110	240	440		<50	<50
	C10 - C14	mg/kg	50						<20	<20
	C15 - C28	mg/kg	100						90	<50
	C29 - C36	mg/kg	100						70	<50
	C10 - C36 (Sum of total)	mg/kg	50						160	<50
	C10 - C40 (Sum of total)	mg/kg	50						130	<100
	C10-C16	mg/kg	50						<50	<50
	C16-C34	mg/kg	100						130	<100
	C34-C40	mg/kg	100						<100	<100
TRH Volatiles/BTEX	Benzene	mg/kg	0.2		0.5	0.5	0.5		<0.1	<0.1
	Ethylbenzene	mg/kg	0.5		55				<0.1	<0.1
	Naphthalene	mg/kg	1		3				<0.5	<0.5
	Toluene	mg/kg	0.5		160	220	310		<0.1	<0.1
	C6 - C9	mg/kg	10						<20	<20
	Total BTEX	mg/kg	0.2							
	Xylene (m & p)	mg/kg	0.5						<0.2	<0.2
	Xylene (o)	mg/kg	0.5						<0.1	<0.1
	Xylene Total	mg/kg	0.5		40	60	95		<0.3	<0.3
	C6-C10 less BTEX (F1)	mg/kg	10		45	70	110		<20	<20
	C6 - C10	mg/kg	10						<20	<20

Result	Exceeds ASC NEPM 2013 Health Investigation Levels - Residential (HIL B)
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 0 to <1m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 1 to <2m, Sand
Result	Exceeds ASC NEPM 2013 Health Screening Levels - Residential A/B, 2 to <4m, Sand

Table LR2
Waste Classification Results
NBN - DSI
754-NTLGE220504-AJ

						Field_ID	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25	BH03_0.2-0.25	BH04_0.15-0.3	BH05_0.2-0.3	BH05_0.4-0.6	BH06_0.2-0.3	BH06_0.7-0.9	BH07_0.2-0.3	BH07_0.9-1.0
						Sampled_Date-Time	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19	05-Jun-19
						Matrix_Description	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
				CT1 NSW 2014 General Solid Waste (No Leaching)	CT2 NSW 2014 Restricted Solid Waste (No Leaching)												
Method_Type	**ChemName**	**Units**	**EQL**														
Asbestos Identification in Soils	APPROVED IDENTIFIER:	--					1	1	1	1	1	1	1	1	1	1	1
	Asbestos (Trace)	Fibres	5				0	0	0	0	0	0	0	0	0	0	0
	Asbestos Type	-					1	1	1	1	1	1	1	1	1	1	1
	Description	--					1	1	1	1	1	1	1	1	1	1	1
	Organic Fibre	g/kg	0.1				0	0	0	0	0	0	0	0	0	0	0
	Synthetic Mineral Fibre	g/kg	0.1				0	0	0	0	0	0	0	0	0	0	0
Moisture Content	Moisture Content	%	1				16.8	15.6	21.9	18.4	9.7	10.1	30	1.7	16.9	9.8	9.9
Organic Matter	Organic Matter	%	0.5				0.6	-	-	-	-	-	-	3.6	-	-	-
PAH/Phenols (SIM)	Acenaphthene	mg/kg	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	mg/kg	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	mg/kg	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)anthracene	mg/kg	0.5				<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.7
	Benzo(a)pyrene	mg/kg	0.5	0.8	3.2		<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.7
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5				0.6	0.6	1.4	0.6	0.6	0.6	0.6	0.6	0.6	1	1.1
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5				1.2	1.2	1.7	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.4
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5				<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.8
	Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(k)fluoranthene	mg/kg	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	mg/kg	0.5				<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
	Benzo[b+j]fluoranthene	mg/kg	0.5				<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.7
	Dibenz(a,h)anthracene	mg/kg	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	mg/kg	0.5				0.8	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.8	2.1
	Fluorene	mg/kg	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	mg/kg	0.5				<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Naphthalene	mg/kg	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	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	1
	Pyrene	mg/kg	0.5				0.8	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	1.6	1.8
	Total PAHs	mg/kg	0.5	200	800		1.6	<0.5	7.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	6.2	7.6
pH (1:5)	pH (Lab)	pH Units	0.1				8.8	-	-	-	-	-	-	9.2	-	-	-
pH in soil using a 0.01M CaCl2 extract	pH (CaCl2)	pH Unit	0.1				8	-	-	-	-	-	-	8.2	-	-	-
Total Mercury by FIMS	Mercury	mg/kg	0.1	4	16		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.2
Total Metals by ICP-AES	Arsenic	mg/kg	5	100	400		6	6	7	8	<5	7	5	<5	<5	6	<5
	Cadmium	mg/kg	1	20	80		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Chromium	mg/kg	2	100	400		9	9	10	11	12	11	6	142	10	51	3
	Copper	mg/kg	5				17	14	8	17	14	18	6	<5	14	11	6
	Lead	mg/kg	5	100	400		86	47	6	21	7	26	18	<5	42	92	100
	Nickel	mg/kg	2	40	160		3	2	2	7	8	11	<2	<2	3	4	<2
	Zinc	mg/kg	5				94	38	12	32	41	46	11	<5	25	89	76
TRH - Semivolatile Fraction	F2-NAPHTHALENE	mg/kg	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C10 - C14	mg/kg	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C15 - C28	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C29 - C36	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C10 - C36 (Sum of total)	mg/kg	50	10000	40000		<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C10 - C40 (Sum of total)	mg/kg	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C10-C16	mg/kg	50				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C34-C40	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH Volatiles/BTEX	Benzene	mg/kg	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
	Ethylbenzene	mg/kg	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
	Naphthalene	mg/kg	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	mg/kg	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
	C6 - C9	mg/kg	10	650	2600		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Total BTEX	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (m & p)	mg/kg	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 (o)	mg/kg	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 Total	mg/kg	0.5	1000	4000		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	C6-C10 less BTEX (F1)	mg/kg	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C6 - C10	mg/kg	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Result	Exceeds criteria for General Solid Waste CT1
Result	Exceeds criteria for Restricted Solid Waste CT2

Notes:
ND Not Detected
- Not Tested

Table LR3
QA/QC Results
NBN - DSI
754-NTLGE220504-AJ

Field Duplicates (SOIL)
Filter: SDG in('ALSE-Sydney 06-Jun-19')

Method_Type	ChemName	Units	EQL	SDG	ALSE-Sydney 06-Jun-19	ALSE-Sydney 06-Jun-19		ALSE-Sydney 06-Jun-19	Interlab_D	
				Field ID	BH04_0.15-0.3	QC1	RPD	BH04_0.15-0.3	QC2	RPD
				Sampled Date/Time	6/5/2019 15:00	6/5/2019 15:00		6/5/2019 15:00	6/5/2019 15:00	
Moisture Content	Moisture Content	%	1		9.7	9.3	4	9.7		
PAH/Phenols (SIM)	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5		0.6	0.6	0	0.6	<0.5	18
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		1.2	1.2	0	1.2	<0.5	0
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5		<0.5	<0.5	0	<0.5	<0.5	0
TRH Volatiles/BTEX	Benzene	mg/kg	0.2		<0.2	<0.2	0	<0.2	<0.2	0
	Ethylbenzene	mg/kg	0.5 (Primary): 1 (Interlab)		<0.5	<0.5	0	<0.5	<1.0	0
	Toluene	mg/kg	0.5		<0.5	<0.5	0	<0.5	<0.5	0
	Total BTEX	mg/kg	0.2		<0.2	<0.2	0	<0.2		
	Xylene (m & p)	mg/kg	0.5 (Primary): 2 (Interlab)		<0.5	<0.5	0	<0.5	<2.0	0
	Xylene (o)	mg/kg	0.5 (Primary): 1 (Interlab)		<0.5	<0.5	0	<0.5	<1.0	0
	Xylene Total	mg/kg	0.5 (Primary): 1 (Interlab)		<0.5	<0.5	0	<0.5	<1.0	0
	C6-C10 less BTEX (F1)	mg/kg	10 (Primary): 25 (Interlab)		<10.0	<10.0	0	<10.0	<25.0	0
Total Mercury by FIMS	Mercury	mg/kg	0.1		<0.1	<0.1	0	<0.1	<0.1	0
Total Metals by ICP-AES	Arsenic	mg/kg	5 (Primary): 4 (Interlab)		<5.0	6.0	18	<5.0	4.0	0
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab)		<1.0	<1.0	0	<1.0	<0.4	0
	Chromium	mg/kg	2 (Primary): 1 (Interlab)		12.0	18.0	40	**12.0**	**7.0**	**53**
	Copper	mg/kg	5 (Primary): 1 (Interlab)		14.0	14.0	0	14.0	12.0	15
	Lead	mg/kg	5 (Primary): 1 (Interlab)		7.0	8.0	13	**7.0**	**4.0**	**55**
	Nickel	mg/kg	2 (Primary): 1 (Interlab)		8.0	9.0	12	8.0	6.0	29
	Zinc	mg/kg	5 (Primary): 1 (Interlab)		41.0	43.0	5	**41.0**	**27.0**	**41**
PAH/Phenols (SIM)	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Benzo(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)		<0.5	<0.5	0	<0.5	<0.05	0
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Benzo(k)fluoranthene	mg/kg	0.5		<0.5	<0.5	0	<0.5		
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Benzo[b+j]fluoranthene	mg/kg	0.5		<0.5	<0.5	0	<0.5		
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)		<0.5	<0.5	0	<0.5	<0.1	0
	Total PAHs	mg/kg	0.5		<0.5	<0.5	0	<0.5		
TRH Volatiles/BTEX	Naphthalene	mg/kg	1 (Primary): 0.1 (Interlab)		<1.0	<1.0	0	<1.0	<0.1	0
TRH - Semivolatile Fraction	F2-NAPHTHALENE	mg/kg	50		<50.0	<50.0	0	<50.0	<50.0	0
	C10 - C14	mg/kg	50		<50.0	<50.0	0	<50.0	<50.0	0
	C15 - C28	mg/kg	100		<100.0	<100.0	0	<100.0	<100.0	0
	C29 - C36	mg/kg	100		<100.0	<100.0	0	<100.0	<100.0	0
	C10 - C36 (Sum of total)	mg/kg	50		<50.0	<50.0	0	<50.0		
	C10 - C40 (Sum of total)	mg/kg	50		<50.0	<50.0	0	<50.0	<50.0	0
	C10-C16	mg/kg	50		<50.0	<50.0	0	<50.0	<50.0	0
	C16-C34	mg/kg	100		<100.0	<100.0	0	<100.0	<100.0	0
	C34-C40	mg/kg	100		<100.0	<100.0	0	<100.0	<100.0	0
TRH Volatiles/BTEX	C6 - C9	mg/kg	10 (Primary): 25 (Interlab)		<10.0	<10.0	0	<10.0	<25.0	0
	C6 - C10	mg/kg	10 (Primary): 25 (Interlab)		<10.0	<10.0	0	<10.0	<25.0	0

*RPDs have only been considered where a concentration is greater than 0 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 50 (0-10 x EQL); 30 (10-20 x EQL); 30 (> 20 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.117-Jun-19 9:56:21 AM										
5	From File	WorkSheet_b.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	Benzo(a)pyrene											
12												
13	General Statistics											
14	Total Number of Observations					11		Number of Distinct Observations				4
15								Number of Missing Observations				0
16	Minimum					0.5		Mean				0.564
17	Maximum					0.9		Median				0.5
18	SD					0.129		Std. Error of Mean				0.0388
19	Coefficient of Variation					0.228		Skewness				2.216
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.592		Shapiro Wilk GOF Test				
23	5% Shapiro Wilk Critical Value					0.85		Data Not Normal at 5% Significance Level				
24	Lilliefors Test Statistic					0.417		Lilliefors GOF Test				
25	5% Lilliefors Critical Value					0.251		Data Not Normal at 5% Significance Level				
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL							95% UCLs (Adjusted for Skewness)				
30	95% Student's-t UCL					0.634		95% Adjusted-CLT UCL (Chen-1995)				0.655
31								95% Modified-t UCL (Johnson-1978)				0.638
32												
33	Gamma GOF Test											
34	A-D Test Statistic					2.111		Anderson-Darling Gamma GOF Test				
35	5% A-D Critical Value					0.729		Data Not Gamma Distributed at 5% Significance Level				
36	K-S Test Statistic					0.431		Kolmogorov-Smirnov Gamma GOF Test				
37	5% K-S Critical Value					0.255		Data Not Gamma Distributed at 5% Significance Level				
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					26.2		k star (bias corrected MLE)				19.12
42	Theta hat (MLE)					0.0215		Theta star (bias corrected MLE)				0.0295
43	nu hat (MLE)					576.5		nu star (bias corrected)				420.6
44	MLE Mean (bias corrected)					0.564		MLE Sd (bias corrected)				0.129
45								Approximate Chi Square Value (0.05)				374
46	Adjusted Level of Significance					0.0278		Adjusted Chi Square Value				366.9
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					0.634		95% Adjusted Gamma UCL (use when n<50)				0.646
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.61		Shapiro Wilk Lognormal GOF Test				
53	5% Shapiro Wilk Critical Value					0.85		Data Not Lognormal at 5% Significance Level				

	A	B	C	D	E	F	G	H	I	J	K	L
54				Lilliefors Test Statistic		0.424	Lilliefors Lognormal GOF Test					
55				5% Lilliefors Critical Value		0.251	Data Not Lognormal at 5% Significance Level					
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59				Minimum of Logged Data		-0.693				Mean of logged Data		-0.593
60				Maximum of Logged Data		-0.105				SD of logged Data		0.195
61												
62	Assuming Lognormal Distribution											
63				95% H-UCL		0.632				90% Chebyshev (MVUE) UCL		0.662
64				95% Chebyshev (MVUE) UCL		0.707				97.5% Chebyshev (MVUE) UCL		0.77
65				99% Chebyshev (MVUE) UCL		0.893						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data do not follow a Discernible Distribution (0.05)											
69												
70	Nonparametric Distribution Free UCLs											
71				95% CLT UCL		0.627				95% Jackknife UCL		0.634
72				95% Standard Bootstrap UCL		N/A				95% Bootstrap-t UCL		N/A
73				95% Hall's Bootstrap UCL		N/A				95% Percentile Bootstrap UCL		N/A
74				95% BCA Bootstrap UCL		N/A						
75				90% Chebyshev(Mean, Sd) UCL		0.68				95% Chebyshev(Mean, Sd) UCL		0.733
76				97.5% Chebyshev(Mean, Sd) UCL		0.806				99% Chebyshev(Mean, Sd) UCL		0.95
77												
78	Suggested UCL to Use											
79				95% Student's-t UCL		0.634				or 95% Modified-t UCL		0.638
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

1	UCL Statistics for Uncensored Full Data Sets										
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.117-Jun-19 9:55:27 AM									
5	From File	WorkSheet_a.xls									
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Number of Bootstrap Operations	2000									
9											
10											
11	Chromium										
12											
13	General Statistics										
14	Total Number of Observations		11			Number of Distinct Observations			8		
15						Number of Missing Observations			0		
16	Minimum		3			Mean			24.91		
17	Maximum		142			Median			10		
18	SD		40.91			Std. Error of Mean			12.33		
19	Coefficient of Variation		1.642			Skewness			2.828		
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic		0.526			Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value		0.85			Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic		0.442			Lilliefors GOF Test					
25	5% Lilliefors Critical Value		0.251			Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL		47.26			95% Adjusted-CLT UCL (Chen-1995)			56.43		
31						95% Modified-t UCL (Johnson-1978)			49.02		
32											
33	Gamma GOF Test										
34	A-D Test Statistic		1.609			Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value		0.757			Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic		0.412			Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value		0.264			Data Not Gamma Distributed at 5% Significance Level					
38	Data Not Gamma Distributed at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)		0.882			k star (bias corrected MLE)			0.702		
42	Theta hat (MLE)		28.24			Theta star (bias corrected MLE)			35.48		
43	nu hat (MLE)		19.4			nu star (bias corrected)			15.45		
44	MLE Mean (bias corrected)		24.91			MLE Sd (bias corrected)			29.73		
45						Approximate Chi Square Value (0.05)			7.573		
46	Adjusted Level of Significance		0.0278			Adjusted Chi Square Value			6.693		
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL (use when n>=50))		50.81			95% Adjusted Gamma UCL (use when n<50)			57.48		
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic		0.817			Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value		0.85			Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
54				Lilliefors Test Statistic		0.343	Lilliefors Lognormal GOF Test					
55				5% Lilliefors Critical Value		0.251	Data Not Lognormal at 5% Significance Level					
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59				Minimum of Logged Data		1.099			Mean of logged Data			2.551
60				Maximum of Logged Data		4.956			SD of logged Data			1.039
61												
62	Assuming Lognormal Distribution											
63				95% H-UCL		60.4			90% Chebyshev (MVUE) UCL			41.09
64				95% Chebyshev (MVUE) UCL		50.38			97.5% Chebyshev (MVUE) UCL			63.29
65				99% Chebyshev (MVUE) UCL		88.64						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data do not follow a Discernible Distribution (0.05)											
69												
70	Nonparametric Distribution Free UCLs											
71				95% CLT UCL		45.2			95% Jackknife UCL			47.26
72				95% Standard Bootstrap UCL		44.23			95% Bootstrap-t UCL			275.5
73				95% Hall's Bootstrap UCL		262.3			95% Percentile Bootstrap UCL			48.91
74				95% BCA Bootstrap UCL		60.18						
75				90% Chebyshev(Mean, Sd) UCL		61.91			95% Chebyshev(Mean, Sd) UCL			78.67
76				97.5% Chebyshev(Mean, Sd) UCL		101.9			99% Chebyshev(Mean, Sd) UCL			147.6
77												
78	Suggested UCL to Use											
79				95% Chebyshev (Mean, Sd) UCL		78.67						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

Appendix D – Laboratory Data

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1917426**	Page	: 1 of 14
Client	: **COFFEY ENVIRONMENTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CRAIG SCHRADER	Contact	: Customer Services ES
Address	: 19 WARABRROK BOULEVARD WARABROOK NSW, AUSTRALIA 2304	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4016 2300	Telephone	: +61-2-8784 8555
Project	: 754-NTLGE220504 NBN-DSI, THE HILL	Date Samples Received	: 06-Jun-2019 15:03
Order number	:	Date Analysis Commenced	: 07-Jun-2019
C-O-C number	: ----	Issue Date	: 14-Jun-2019 16:39
Sampler	: SAM RAMSEY		
Site	:		
Quote number	: EN/222		
No. of samples received	: 29		
No. of samples analysed	: 23		

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
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Peter Wu		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.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- 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.
- **EA200: As only one sample container was submitted for multiple tests, at the client's request, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly.**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25	BH03_0.2-0.25	BH04_0.15-0.3
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1917426-001	ES1917426-002	ES1917426-004	ES1917426-005	ES1917426-007
				Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	8.0	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.8	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	146	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	16.8	15.6	21.9	18.4	9.7
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	35.0	----	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g	44.8	----	----	----	----
Exchangeable Potassium	----	0.2	meq/100g	0.4	----	----	----	----
Exchangeable Sodium	----	0.2	meq/100g	0.8	----	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g	81.0	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	0.005	%	1.12	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	6	6	7	8	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	9	9	10	11	12
Copper	7440-50-8	5	mg/kg	17	14	8	17	14
Lead	7439-92-1	5	mg/kg	86	47	6	21	7
Nickel	7440-02-0	2	mg/kg	3	2	2	7	8
Zinc	7440-66-6	5	mg/kg	94	38	12	32	41
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.6	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25	BH03_0.2-0.25	BH04_0.15-0.3
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-001	ES1917426-002	ES1917426-004	ES1917426-005	ES1917426-007
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	0.5	mg/kg		**0.8**	<0.5	**1.2**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		**0.8**	<0.5	**1.1**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	**0.7**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	**0.7**	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	**1.2**	<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	**0.9**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	**0.7**	<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	**1.0**	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**1.6**	<0.5	**7.5**	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	**1.2**	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**1.4**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.7**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25	BH03_0.2-0.25	BH04_0.15-0.3
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-001	ES1917426-002	ES1917426-004	ES1917426-005	ES1917426-007
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
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	%		82.8	86.5	86.6	82.6	86.8
2-Chlorophenol-D4	93951-73-6	0.5	%		86.4	90.6	90.3	86.9	91.6
2.4.6-Tribromophenol	118-79-6	0.5	%		72.6	75.8	77.0	77.3	75.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		116	118	118	117	118
Anthracene-d10	1719-06-8	0.5	%		87.4	92.2	95.9	91.5	91.9
4-Terphenyl-d14	1718-51-0	0.5	%		101	104	102	104	109
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		97.2	92.7	87.8	102	87.3
Toluene-D8	2037-26-5	0.2	%		99.7	104	93.3	106	82.7
4-Bromofluorobenzene	460-00-4	0.2	%		92.7	90.9	81.2	99.9	82.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QC1	BH05_0.2-0.3	BH05_0.4-0.6	BH06_0.2-0.3	BH06_0.7-0.9
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1917426-009	ES1917426-010	ES1917426-011	ES1917426-013	ES1917426-014
				Result	Result	Result	Result	Result
EA001: pH in soil using 0.01M CaCl extract								
pH (CaCl2)	----	0.1	pH Unit	----	----	----	8.2	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	----	----	----	9.2	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	----	----	----	78	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	9.3	10.1	30.0	1.7	16.9
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	28.7	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	21.4	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	<0.2	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	<0.2	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	50.3	----
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	0.005	%	----	----	----	0.478	----
Arsenic	7440-38-2	5	mg/kg	6	7	5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	18	11	6	142	10
Copper	7440-50-8	5	mg/kg	14	18	6	<5	14
Lead	7439-92-1	5	mg/kg	8	26	18	<5	42
Nickel	7440-02-0	2	mg/kg	9	11	<2	<2	3
Zinc	7440-66-6	5	mg/kg	43	46	11	<5	25
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	----	3.6	----
Total Organic Carbon	----	0.5	%	----	----	----	2.1	----
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC1	BH05_0.2-0.3	BH05_0.4-0.6	BH06_0.2-0.3	BH06_0.7-0.9
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-009	ES1917426-010	ES1917426-011	ES1917426-013	ES1917426-014
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.9**
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	**0.9**
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	**1.8**
^ 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
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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QC1	BH05_0.2-0.3	BH05_0.4-0.6	BH06_0.2-0.3	BH06_0.7-0.9
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-009	ES1917426-010	ES1917426-011	ES1917426-013	ES1917426-014
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
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	%		85.2	85.5	87.7	87.0	83.5
2-Chlorophenol-D4	93951-73-6	0.5	%		89.8	92.1	92.3	91.6	91.0
2.4.6-Tribromophenol	118-79-6	0.5	%		73.6	75.7	80.8	81.3	77.2
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		118	116	120	120	116
Anthracene-d10	1719-06-8	0.5	%		91.6	90.6	94.4	94.9	89.6
4-Terphenyl-d14	1718-51-0	0.5	%		105	105	106	106	101
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		94.0	88.6	84.7	96.3	97.2
Toluene-D8	2037-26-5	0.2	%		104	99.2	93.2	97.9	104
4-Bromofluorobenzene	460-00-4	0.2	%		90.4	94.0	84.5	87.3	92.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH07_0.2-0.3	BH07_0.9-1.0	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	ES1917426-016	ES1917426-017	ES1917426-019	ES1917426-020	ES1917426-021
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	9.8	9.9	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	No	No
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	No	No	No
Asbestos Type	1332-21-4	-	--	----	----	-	-	-
Sample weight (dry)	----	0.01	g	----	----	24.5	12.2	48.7
APPROVED IDENTIFIER:	----	-	--	----	----	C.OWLER	C.OWLER	C.OWLER
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	No	No	No
Organic Fibre	----	0.1	g/kg	----	----	No	No	No
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	6	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	51	3	----	----	----
Copper	7440-50-8	5	mg/kg	11	6	----	----	----
Lead	7439-92-1	5	mg/kg	92	100	----	----	----
Nickel	7440-02-0	2	mg/kg	4	<2	----	----	----
Zinc	7440-66-6	5	mg/kg	89	76	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.3	0.2	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	1.1	1.0	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	1.8	2.1	----	----	----
Pyrene	129-00-0	0.5	mg/kg	1.6	1.8	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.5	0.7	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	0.6	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.6	0.7	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.6	0.7	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.2-0.3	BH07_0.9-1.0	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-016	ES1917426-017	ES1917426-019	ES1917426-020	ES1917426-021
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**6.2**	**7.6**	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		**0.7**	**0.8**	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**1.0**	**1.1**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.3**	**1.4**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**87.1**	**86.9**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**91.1**	**92.5**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.2-0.3	BH07_0.9-1.0	BH01_0.2-0.3	BH01_0.7-0.8	BH02_0.1-0.25
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-016	ES1917426-017	ES1917426-019	ES1917426-020	ES1917426-021
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
2.4.6-Tribromophenol	118-79-6	0.5	%		76.7	73.3	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		121	120	----	----	----
Anthracene-d10	1719-06-8	0.5	%		93.8	94.3	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		106	103	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		95.6	94.6	----	----	----
Toluene-D8	2037-26-5	0.2	%		104	105	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		92.5	93.8	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.2-0.25	BH04_0.15-0.3	BH05_0.2-0.3	BH05_0.4-0.6	BH06_0.2-0.3
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		ES1917426-022	ES1917426-023	ES1917426-024	ES1917426-025	ES1917426-026
					Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		**No**	**No**	**No**	**No**	**No**
Asbestos (Trace)	1332-21-4	5	Fibres		**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--		**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g		**15.1**	**23.9**	**29.2**	**19.5**	**23.8**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**
Synthetic Mineral Fibre	----	0.1	g/kg		**No**	**No**	**No**	**No**	**No**
Organic Fibre	----	0.1	g/kg		**No**	**No**	**No**	**No**	**No**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH06_0.7-0.9	BH07_0.2-0.3	BH07_0.9-1.0	----	----
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1917426-027	ES1917426-028	ES1917426-029	--------	--------
				Result	Result	Result	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**----**	**----**
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**No**	**No**	**----**	**----**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**----**	**----**
Sample weight (dry)	----	0.01	g	**12.3**	**16.2**	**15.3**	**----**	**----**
APPROVED IDENTIFIER:	----	-	--	**C.OWLER**	**C.OWLER**	**C.OWLER**	**----**	**----**
Synthetic Mineral Fibre	----	0.1	g/kg	**No**	**No**	**No**	**----**	**----**
Organic Fibre	----	0.1	g/kg	**No**	**No**	**No**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH01_0.2-0.3 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH01_0.7-0.8 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH02_0.1-0.25 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH03_0.2-0.25 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH04_0.15-0.3 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH05_0.2-0.3 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH05_0.4-0.6 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH06_0.2-0.3 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH06_0.7-0.9 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH07_0.2-0.3 - 05-Jun-2019 00:00	Mid brown soil.
EA200: Description	BH07_0.9-1.0 - 05-Jun-2019 00:00	Mid brown soil.

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	: **ES1917426**	Page	: 1 of 10
Client	: **COFFEY ENVIRONMENTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CRAIG SCHRADER	Contact	: Customer Services ES
Address	: 19 WARABRROK BOULEVARD WARABROOK NSW, AUSTRALIA 2304	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 4016 2300	Telephone	: +61-2-8784 8555
Project	: 754-NTLGE220504 NBN-DSI, THE HILL	Date Samples Received	: 06-Jun-2019
Order number	:	Date Analysis Commenced	: 07-Jun-2019
C-O-C number	: ----	Issue Date	: 14-Jun-2019
Sampler	: SAM RAMSEY		
Site	:		
Quote number	: EN/222		
No. of samples received	: 29		
No. of samples analysed	: 23		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Peter Wu		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: 2397248)									
ES1917307-008	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	56	53	5.61	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	13	7	57.9	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	9	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	80	70	12.8	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	78	74	6.09	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	169	168	1.09	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	55500	46900	16.8	0% - 20%
ES1917311-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	11	10.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	12	33.3	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	38	24	44.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	26	23	14.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	51	42	18.8	0% - 50%
		EG005T: Iron	7439-89-6	50	mg/kg	10500	10700	1.63	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2397968)									
ES1917396-057	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	48	43	10.0	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	8	8	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	12	13	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	17	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	23	25	7.41	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	18	20	7.08	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	45200	43300	4.42	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: 2397968) - continued									
ES1917396-078	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	32	33	4.90	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	11	13	12.4	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	16	16	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	15	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	21	23	8.41	No Limit
		EG005T: Iron	7439-89-6	50	mg/kg	23600	25400	7.12	0% - 20%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2399224)									
ES1916856-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	24	28	12.2	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	22	21	0.00	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	7	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	74	75	2.18	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	193	196	1.32	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	295	325	9.44	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	34900	36900	5.39	0% - 20%
EA001: pH in soil using 0.01M CaCl extract (QC Lot: 2400816)									
ES1917426-001	BH01_0.2-0.3	EA001: pH (CaCl2)	----	0.1	pH Unit	8.0	8.1	0.00	0% - 20%
EA002: pH 1:5 (Soils) (QC Lot: 2392706)									
ES1917256-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	10.0	9.9	0.00	0% - 20%
ES1917392-004	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.8	8.7	0.00	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 2392705)									
ES1916360-006	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	120	115	4.41	0% - 20%
ES1917392-004	Anonymous	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	80	82	3.20	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2393575)									
ES1917396-073	Anonymous	EA055: Moisture Content	----	0.1	%	15.0	14.7	2.05	0% - 50%
ES1917426-002	BH01_0.7-0.8	EA055: Moisture Content	----	0.1	%	15.6	17.0	8.56	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2393576)									
ES1917426-017	BH07_0.9-1.0	EA055: Moisture Content	----	0.1	%	9.9	10.8	8.40	0% - 50%
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 2397980)									
ES1917426-001	BH01_0.2-0.3	ED006: Exchangeable Calcium	----	0.2	meq/100g	35.0	33.0	5.63	0% - 20%
		ED006: Exchangeable Magnesium	----	0.2	meq/100g	44.8	51.4	13.7	0% - 20%
		ED006: Exchangeable Potassium	----	0.2	meq/100g	0.4	0.2	64.3	No Limit
		ED006: Exchangeable Sodium	----	0.2	meq/100g	0.8	0.6	15.0	No Limit
		ED006: Cation Exchange Capacity	----	0.2	meq/100g	81.0	85.4	5.22	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2397249)									
ES1917307-008	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1917311-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	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 (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2397969)									
ES1917396-057	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.6	140	No Limit
ES1917396-078	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: 2399225)									
ES1916856-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.1	0.00	No Limit
EP004: Organic Matter (QC Lot: 2393571)									
ES1917426-001	BH01_0.2-0.3	EP004: Organic Matter	----	0.5	%	0.6	0.6	0.00	No Limit
		EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2392658)									
ES1917365-090	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	1.7	1.0	54.2	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	2.3	2.8	18.8	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.5	0.6	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	1.8	2.7	36.8	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	15.9	# 20.7	26.4	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	3.8	4.9	24.8	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	18.0	20.6	13.5	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	18.9	21.9	14.7	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	9.7	10.6	9.19	0% - 20%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	8.8	9.9	11.1	0% - 50%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	9.5	9.6	1.15	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	4.3	4.2	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	10.1	10.5	3.58	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	4.9	4.8	2.18	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	1.4	1.4	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	6.7	6.5	2.33	0% - 50%
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	118	133	11.5	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	14.5	15.0	3.32	0% - 20%
ES1917426-005	BH03_0.2-0.25	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

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 (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2392658) - continued									
ES1917426-005	BH03_0.2-0.25	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: 2392556)									
ES1917307-008	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1917426-005	BH03_0.2-0.25	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2392657)									
ES1917365-090	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	350	360	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	200	160	19.4	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1917426-005	BH03_0.2-0.25	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: 2392556)									
ES1917307-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1917426-005	BH03_0.2-0.25	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: 2392657)									
ES1917365-090	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	500	460	6.52	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
ES1917426-005	BH03_0.2-0.25	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: 2392556)									
ES1917307-008	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1917426-005	BH03_0.2-0.25	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

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: 2392556) - continued									
ES1917426-005	BH03_0.2-0.25	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: 2397248)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	101	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.2	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.5	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	99.6	86	120
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	76.5	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	97.6	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	104	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	105	80	122
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2397968)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	111	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	105	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	106	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	104	86	120
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	88.3	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	104	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	114	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	115	80	122
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2399224)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	103	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	88.3	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	100	86	120
EG005T: Iron	7439-89-6	50	mg/kg	<50	8400 mg/kg	78.8	70	130
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	102	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	103	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	114	80	122
EA010: Conductivity (1:5) (QCLot: 2392705)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	93.7	92	108
ED006: Exchangeable Cations on Alkaline Soils (QCLot: 2397980)								
ED006: Exchangeable Calcium	----	0.2	meq/100g	<0.2	2.5 meq/100g	101	80	110
ED006: Exchangeable Magnesium	----	0.2	meq/100g	<0.2	4.17 meq/100g	# 115	80	110
ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	1.28 meq/100g	90.0	80	110
ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	2.17 meq/100g	103	80	110
ED006: Cation Exchange Capacity	----	0.2	meq/100g	<0.2	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2397249)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.7	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2397969)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	85.8	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2399225)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	81.1	70	105
EP004: Organic Matter (QCLot: 2393571)								
EP004: Organic Matter	----	0.5	%	<0.5	2.53 %	94.1	82	98
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	94.5	81	99
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2392658)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	109	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	102	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	107	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	106	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	104	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	111	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	116	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	120	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	101	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	94.8	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	94.3	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	97.7	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	106	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	93.5	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	89.8	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	90.3	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2392556)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	74.6	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2392657)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	107	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	104	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	105	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2392556)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	75.3	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2392657)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	110	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	102	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	108	63	131

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Recovery Limits (%)
				Result	Concentration	LCS	Low	High
EP080: BTEXN (QCLot: 2392556)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	84.7	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	89.0	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	86.8	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	81.2	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	82.7	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	84.9	63	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	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2397248)							
ES1917307-008	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	90.8	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.8	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	94.6	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	109	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	94.4	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	112	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	100	70	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2397968)							
ES1917396-057	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	95.3	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	107	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	103	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	106	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	70	130
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2399224)							
ES1916856-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	108	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	113	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	110	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.5	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	107	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2399224) - continued							
ES1916856-002	Anonymous	EG005T: Zinc	7440-66-6	250 mg/kg	113	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2397249)							
ES1917307-008	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	94.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2397969)							
ES1917396-057	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	95.9	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2399225)							
ES1916856-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	101	70	130
EP004: Organic Matter (QCLot: 2393571)							
ES1917426-001	BH01_0.2-0.3	EP004: Organic Matter	----	0.49 %	108	70	130
		EP004: Total Organic Carbon	----	0.28 %	110	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2392658)							
ES1917365-090	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	106	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	124	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2392556)							
ES1917307-008	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	96.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2392657)							
ES1917365-090	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	85.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	89.5	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	90.2	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2392556)							
ES1917307-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	94.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2392657)							
ES1917365-090	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	92.2	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	106	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	77.4	52	132
EP080: BTEXN (QCLot: 2392556)							
ES1917307-008	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	87.4	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	95.6	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	93.5	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	93.7	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	90.2	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1917426**	Page	: 1 of 8
Client	: **COFFEY ENVIRONMENTS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: CRAIG SCHRADER	Telephone	: +61-2-8784 8555
Project	: 754-NTLGE220504 NBN-DSI, THE HILL	Date Samples Received	: 06-Jun-2019
Site	:	Issue Date	: 14-Jun-2019
Sampler	: SAM RAMSEY	No. of samples received	: 29
Order number	:	No. of samples analysed	: 23

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 Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1917365--090	Anonymous	**Phenanthrene**	85-01-8	26.4 %	0% - 20%	**RPD exceeds LOR based limits**
Laboratory Control Spike (LCS) Recoveries							
ED006: Exchangeable Cations on Alkaline Soils	QC-2397980-002	----	**Exchangeable Magnesium**	----	115 %	80-110%	**Recovery greater than upper control limit**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA001: pH in soil using 0.01M CaCl extract						
Soil Glass Jar - Unpreserved						
BH01_0.2-0.3, BH06_0.2-0.3	13-Jun-2019	12-Jun-2019	**1**	----	----	----

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	3	31	9.68	10.00	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			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA001: pH in soil using 0.01M CaCl extract							
Soil Glass Jar - Unpreserved (EA001)							
BH01_0.2-0.3, BH06_0.2-0.3	**05-Jun-2019**	**13-Jun-2019**	12-Jun-2019	×	**13-Jun-2019**	13-Jun-2019	✓
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
BH01_0.2-0.3, BH06_0.2-0.3	**05-Jun-2019**	**07-Jun-2019**	12-Jun-2019	✓	**07-Jun-2019**	07-Jun-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
EA010: Conductivity (1:5)								
Soil Glass Jar - Unpreserved (EA010)								
BH01_0.2-0.3,	BH06_0.2-0.3	**05-Jun-2019**	**07-Jun-2019**	12-Jun-2019	✓	**07-Jun-2019**	05-Jul-2019	✓
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**----**	----	----	**07-Jun-2019**	19-Jun-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - Subsampled by ALS (EA200)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**----**	----	----	**13-Jun-2019**	02-Dec-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	BH05_0.2-0.3,							
BH05_0.4-0.6,	BH06_0.2-0.3,							
BH06_0.7-0.9,	BH07_0.2-0.3,							
BH07_0.9-1.0								
ED006: Exchangeable Cations on Alkaline Soils								
Soil Glass Jar - Unpreserved (ED006)								
BH01_0.2-0.3,	BH06_0.2-0.3	**05-Jun-2019**	**11-Jun-2019**	03-Jul-2019	✓	**11-Jun-2019**	03-Jul-2019	✓
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**11-Jun-2019**	02-Dec-2019	✓	**11-Jun-2019**	02-Dec-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3								
Soil Glass Jar - Unpreserved (EG005T)								
BH07_0.9-1.0		**05-Jun-2019**	**12-Jun-2019**	02-Dec-2019	✓	**12-Jun-2019**	02-Dec-2019	✓
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**11-Jun-2019**	03-Jul-2019	✓	**12-Jun-2019**	03-Jul-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3								
Soil Glass Jar - Unpreserved (EG035T)								
BH07_0.9-1.0		**05-Jun-2019**	**12-Jun-2019**	03-Jul-2019	✓	**12-Jun-2019**	03-Jul-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
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004)								
BH01_0.2-0.3,	BH06_0.2-0.3	**05-Jun-2019**	**11-Jun-2019**	03-Jul-2019	✓	**11-Jun-2019**	03-Jul-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**08-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	18-Jul-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**07-Jun-2019**	19-Jun-2019	✓	**07-Jun-2019**	19-Jun-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							
Soil Glass Jar - Unpreserved (EP071)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**08-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	18-Jul-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**07-Jun-2019**	19-Jun-2019	✓	**07-Jun-2019**	19-Jun-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							
Soil Glass Jar - Unpreserved (EP071)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**08-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	18-Jul-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							

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)								
BH01_0.2-0.3,	BH01_0.7-0.8,	**05-Jun-2019**	**07-Jun-2019**	19-Jun-2019	✓	**07-Jun-2019**	19-Jun-2019	✓
BH02_0.1-0.25,	BH03_0.2-0.25,							
BH04_0.15-0.3,	QC1,							
BH05_0.2-0.3,	BH05_0.4-0.6,							
BH06_0.2-0.3,	BH06_0.7-0.9,							
BH07_0.2-0.3,	BH07_0.9-1.0							

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)							
Electrical Conductivity (1:5)	EA010	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	3	31	**9.68**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH in soil using a 0.01M CaCl2 extract	EA001	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	5	45	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	5	45	**11.11**	**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	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	45	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	45	**6.67**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	45	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	45	**6.67**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	45	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	45	**6.67**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001	SOIL	In house: Referenced to Rayment and Lyons (2011) 4B3 (mod.) or 4B4 (mod.) 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM (2013) Schedule B(3)
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3)
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).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Exchangeable Cations on Alkaline Soils	ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
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)
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. 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

Preparation Methods	Method	Matrix	Method Descriptions
pH in soil using a 0.01M CaCl2 extract	EA001-PR	SOIL	In house: Referenced to Rayment and Higginson 4B1, 10 g of soil is mixed with 50 mL of 0.01M CaCl2 and tumbled end over end for 1 hour. pH is measured from the continuous suspension. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons 2011 method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
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)
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
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 AND ANALYSIS REQUEST

coffey
A TETRA TECH COMPANY

Consigning Office: Warabrook

Report Results to: Craig Shrader | Mobile: (02) 4016 2300 | Email: paul.wright@coffey.com

Invoices to: general.admin@coffey.com | Phone: (02) 4016 2300 | Email: sam.ramsey@coffey.com

Project No: 754-NTLGE220504 Task No: Lab

Project Name: NBN - DSI, the Hill Laboratory: ALS

Sampler's Name: S.Ramsey Project Manager: Paul Wright

Special Instructions:

Analysis Request Section

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Asbestos (EA200B)	Suite S-26	P22	HOLD	NOTES
1	BH01_0.2-0.3	05-06-19		Soil	Jar	5 day	✓	✓	✓		
2	BH01_0.7-0.8	05-06-19		Soil	Jar	5 day	✓	✓			
3	BH01_1.2-1.3	05-06-19		Soil	Jar	5 day				✓	
4	BH02_0.1-0.25	05-06-19		Soil	Jar	5 day	✓	✓			
5	BH03_0.2-0.25	05-06-19		Soil	Jar	5 day	✓	✓			
6	[redacted]	05-06-19		Soil	Jar	5 day				✓	
7	BH04_0.15-0.3	05-06-19		Soil	Jar	5 day	✓	✓			
8	[redacted]	05-06-19		Soil	Jar	5 day				✓	
9	QC1	05-06-19		Soil	Jar	5 day		✓			
10	QC2	05-06-19		Soil	Jar	5 day		✓			Send to Envirolab
11	BH05_0.2-0.3	05-06-19		Soil	Jar	5 day	✓	✓			
12	BH05_0.4-0.6	05-06-19		Soil	Jar	5 day	✓	✓			
13	[redacted]	05-06-19		Soil	Jar	5 day				✓	
14	BH06_0.2-0.3	05-06-19		Soil	Jar	5 day	✓	✓	✓		
15	BH06_0.7-0.9	05-06-19		Soil	Jar	5 day	✓	✓			
16	BH06_1.5	05-06-19		Soil	Jar	5 day				✓	
17	BH07_0.2-0.3	05-06-19		Soil	Jar	5 day	✓	✓			
18	BH07_0.9-1.0	05-06-19		Soil	Jar	5 day	✓	✓			
	[redacted]	05-06-19		Soil	Jar	5 day				✓	

LAB COPY ONLY

Environmental Division Sydney
Work Order Reference
ES1917426

Telephone : + 61-2-8784 8555

Please send QC2 to Envirolab (Lab Test - Soil Combination 3)

RELINQUISHED BY		x	
Name: Sam Ramsey	Date: 6/06/2019	Name: KM	Date: 6/6/19
Coffey Environments	Time:	Company: ALS	Time: 1500
Name: DB	Date: 6/6/19	Name: AJ	Date: 6/6/19
Company: ALS	Time: 17:30	Company: ALS	Time: 19:30

Sample Receipt Advice: (Lab Use Only)

All Samples Recieved in Good Condition ☐

All Documentation is in Proper Order ☐

Samples Received Properly Chilled 3.1° ☐ ICE

Lab. Ref/Batch No.

***Container Type & Preservation Codes:** P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric

Reference No. _____

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

coffey
A TETRA TECH COMPANY

Consigning Office: Warabrook

Report Results to: Craig Shrader — Mobile: (02) 4016 2300 — Email: paul.wright@coffey.com

Invoices to: general.admin@coffey.com — Phone: (02) 4016 2300 — Email: sam.ramsey@coffey.com

Project No: 754-NTLGE220504 — Task No: Lab

Project Name: NBN - DSI the Hill — Laboratory: ALS

Sampler's Name: S.Ramsey — Project Manager: Paul Wright

Special Instructions:

Analysis Request Section

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Asbestos (EA200B)	Suite S-26	P22	HOLD
1	BH01_0.2-0.3	05-06-19		Soil	Jar	5 day (1)	✓	✓	✓	
2	BH01_0.7-0.8	05-06-19		Soil	Jar	5 day (2)	✓	✓		
3	BH01_1.2-1.3	05-06-19		Soil	Jar	5 day				✓
4	BH02_0.1-0.25	05-06-19		Soil	Jar	5 day (3)	✓	✓		
5	BH03_0.2-0.25	05-06-19		Soil	Jar	5 day (4)	✓	✓		
6	BH03_0.55-0.4	05-06-19		Soil	Jar	5 day				✓
7	BH04_0.15-0.3	05-06-19		Soil	Jar	5 day (5)	✓	✓		
8	BH04_0.5-1.0	05-06-19		Soil	Jar	5 day				✓
9	QC1	05-06-19		Soil	Jar	5 day		✓		
	QC2	05-06-19		Soil	Jar	5 day		✓		
10	BH05_0.2-0.3	05-06-19		Soil	Jar	5 day (6)	✓	✓		
11	BH05_0.4-0.6	05-06-19		Soil	Jar	5 day (7)	✓	✓		
12	BH05_0.9-1.0	05-06-19		Soil	Jar	5 day				✓
13	BH06_0.2-0.3	05-06-19		Soil	Jar	5 day (8)	✓	✓	✓	
14	BH06_0.7-0.9	05-06-19		Soil	Jar	5 day (9)	✓	✓		
15	BH06_1.5	05-06-19		Soil	Jar	5 day				✓
16	BH07_0.2-0.3	05-06-19		Soil	Jar	5 day (10)	✓	✓		
17	BH07_0.9-1.0	05-06-19		Soil	Jar	5 day (11)	✓	✓		
18	BH07_1.5-1.6	05-06-19		Soil	Jar	5 day				✓

NOTES

Send to Envirolab

Please send QC2 to Envirolab (Test - Soil Combination 3)

Environmental Division Sydney
Work Order Reference
ES1917426

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 219216
Date Received: 7/6/19
Time Received: 13:46
Received by: JH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

RELINQUISHED BY

Name: Sam Ramsey	Date: 6/06/2019	Name: KM	Date: 6/6/19	Sample Receipt Advice: (Lab Use Only)	
Coffey Environments	Time:	Company: ALS	Time: 1500	All Samples Recieved in Good Condition	☐
Name:	Date:	Name: JH	Date: 7/6/2019	All Documentation Is in Proper Order	☐
Company:	Time:	Company: EVS	Time: 1346	Samples Received Properly Chilled 3.1°C	☐ ICE
				Lab. Ref/Batch No.	

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar. V- Vial. Z - Ziplock bag. N - Nitric Acid Preserved. C - Hydrochloric Acid Preserved. S - Sulphuric

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 219218

Client Details

Client	Coffey Environment (Warabrook)
Attention	Sam Ramsey, Craig Schrader, Paul Wright
Address	Lot 101, 19 Warabrook Blvd, Warabrook, NSW, 2304

Sample Details

Your Reference	**754-NTLGE220504, NBN-DSI, the Hill**
Number of Samples	1 Soil
Date samples received	07/06/2019
Date completed instructions received	07/06/2019

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	17/06/2019
Date of Issue	12/06/2019

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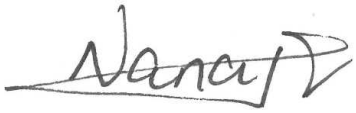
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Giovanni Agosti, Group Technical Manager
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		219218-1
Your Reference	UNITS	QC2
Date Sampled		05/06/2019
Type of sample		Soil
Date extracted	-	11/06/2019
Date analysed	-	12/06/2019
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	<1
Surrogate aaa-Trifluorotoluene	%	102

svTRH (C10-C40) in Soil		
Our Reference		219218-1
Your Reference	UNITS	QC2
Date Sampled		05/06/2019
Type of sample		Soil
Date extracted	-	11/06/2019
Date analysed	-	12/06/2019
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	%	89

PAHs in Soil		
Our Reference	UNITS	219218-1
Your Reference		QC2
Date Sampled		05/06/2019
Type of sample		Soil
Date extracted	-	11/06/2019
Date analysed	-	12/06/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	106

Acid Extractable metals in soil		
Our Reference		219218-1
Your Reference	UNITS	QC2
Date Sampled		05/06/2019
Type of sample		Soil
Date prepared	-	11/06/2019
Date analysed	-	11/06/2019
Arsenic	mg/kg	4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	7
Copper	mg/kg	12
Lead	mg/kg	4
Mercury	mg/kg	<0.1
Nickel	mg/kg	6
Zinc	mg/kg	27

Moisture		
Our Reference		219218-1
Your Reference	UNITS	QC2
Date Sampled		05/06/2019
Type of sample		Soil
Date prepared	-	11/06/2019
Date analysed	-	12/06/2019
Moisture	%	5.4

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	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-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	-			11/06/2019	[NT]	[NT]	[NT]	[NT]	11/06/2019	[NT]
Date analysed	-			12/06/2019	[NT]	[NT]	[NT]	[NT]	12/06/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	96	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	91	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	102	[NT]	[NT]	[NT]	[NT]	103	[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	-			11/06/2019	[NT]	[NT]	[NT]	[NT]	11/06/2019	[NT]
Date analysed	-			12/06/2019	[NT]	[NT]	[NT]	[NT]	12/06/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-003	89	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			11/06/2019	[NT]	[NT]	[NT]	[NT]	11/06/2019	[NT]
Date analysed	-			12/06/2019	[NT]	[NT]	[NT]	[NT]	12/06/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	107	[NT]	[NT]	[NT]	[NT]	103	[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	-			11/06/2019	[NT]	[NT]	[NT]	[NT]	11/06/2019	[NT]
Date analysed	-			11/06/2019	[NT]	[NT]	[NT]	[NT]	11/06/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	104	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[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.

Appendix E – Calibration Certificates

AirMet Scientific P/L
Level 3, 18-26 Dickson Avenue
Artarmon
NSW 2064, Australia
Tel: 02 8425 8300
Fax: 02 8425 8399

Calibration Certificate

This document certifies that the instrument detailed has been calibrated to the parameters

Certificate Print Date: 12-Dec-2018
Calibration Date: 11-Dec-2018
Next Calibration Due: 9-Jun-2019
Call ID: 234112
Job Number: S2341120001

Customer: Coffey Environments Pty Ltd-ID 203374
Serial No: 595-001069
Description: MINIRAE

Calibration Summary

Frequency: 180 Days **Temp:** 24°C **As Found:** In Tolerance **Result:** Pass
Humidity: 60% **Certificate:** S2341120001

Desc	As Found Actual	As Found Result	As Left (Cal Status) Actual	As Left (Cal Status) Result
PID ppm	98.0	Pass	100.0	Pass

Standard Used

Equip ID	Description	Valid Until	Cert
SYFRESHAIR	Ambient Air	29-08-2028	
SY211	ISOBUTYLENE 100PPM. AIR BALANCE	07-01-2021	400273640

Completed By: Jason Cheng

Signed: 

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