Report on Supplementary Contamination Assessment

Stage 5-14 Radcliffe, Wyee Residential Subdivision

82219014

Prepared for

Wyee Land Pty Ltd C/- Northrop Consulting Engineers

24 October 2018

Cardno

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1 Introduction

1.1 Background

Cardno (NSW/ACT) Pty Ltd (Cardno) were engaged by Northrop Consulting Engineers (Northrop) on behalf of Wyee Land Pty Ltd, to undertake a Supplementary Contamination Assessment (SCA) for the proposed Radcliffe, Wyee residential development, located at Lot 173 DP 1212974 & Lot 212 DP 866437, off Bushells Ridge Road, Wyee. The assessment area and site boundaries are shown on **Figure 1**, attached in **Appendix A.**

The site was the subject of a previous Douglas Partners *Preliminary Geotechnical and Contamination Assessment* report ("DP Report") (JN. 41810, date. July 2009) [1] and is discussed in more detail in in Section 2.

The current investigation was undertaken to address issue previous identified in the DP Report [1] and was targeted to the following:

- Proposed Stage 5 and Stages 6-14 of the Site which typically comprised open pasture with limited development; and
- Former 'Quarried Area' identified in previous DP Report [1] and located within titled Lot 212 DP866437.

The DP Report [1] included a preliminary contamination assessment on larger parcels of land within the area, which included the current investigation area, however no intrusive sampling was undertaken within the current investigation area.

The current SCA utilises information provided within the previous DP Report [1] and other publicly available data, along with the results of limited intrusive sampling with the investigation area.

The SCA was carried out in general accordance with the Cardno's fee proposal 48980519-003.2, dated 1st August, 2018.

1.2 Purpose and Objectives

The assessment was undertaken to assess the potential for contamination to constrain the proposed development of the site into a low-density residential subdivision.

The objective of the SCA was to:

- Provide additional environmental data to assess potential contamination issues previously identified in the DP Report [1].
- Interviews with individuals familiar with the site.
- Assess potential contamination not considered by the DP Report [1].
- Assess potential contamination and contaminating activities, if any, that have occurred since the release of the DP Report [1].
- Assess the requirement; if any, for further environmental works required to make the site suitable for the proposed use.

1.3 Scope

Cardno carried out the following tasks to confirm currency of information provided within the previous DP Report [1] and satisfy the purpose and objectives of this assessment.

Defined the Site, Features & Surrounds:

- Defined the site boundaries based on title information, available data and established a site base plan.
- Identified the site features including main structures, associated infrastructure and other services.

- Defined the topography, surface water drainage of the site and its proximity to the nearest surface water body and any associated potentially sensitive aquatic ecosystems.
- Identified the location of nearby sensitive environments and receptors such as residential areas, wetlands, streams or rivers.
- Identified the zoning of the site under the local Planning Scheme.
- Reviewed previous contamination assessment and classification of the Site.

Hydrogeology & Groundwater Resource Use

- Ascertained the actual utilisation of groundwater at and in the vicinity of the site through a search of the NSW Groundwater Database at NSW Office of Water website.

Review of Public Records on Site History

- Publicly available documents relevant to the site (to the extent readily available):
  - Historical imagery available
  - Historical and current maps of the area
- Selected historical aerial photos presented in previous DP Report [1] (additionally available from the Department of Lands).
- Public registers such as provided below to identified any sites (this and nearby sites):
  - NSW EPA Contaminated Lands Register

Site Inspection & Surrounds

- Confirmed the site features and identified any visible evidence of fuel storage tanks (above or below ground) and other infrastructure with potential to cause contamination of soil and/or groundwater.
- Checked for evidence of soil type and evidence of site cutting and filling or subsidence or placement of solid wastes.
- Assessed the surrounding area (to a radius of about 200 m and to the extent possible) for potential sources of contamination of soil or groundwater at the site.

Intrusive Site Investigation Sampling & Testing

- Performed intrusive investigation of soil conditions at the site by excavation, sampling at selected locations and applying methods set out in the following sections of this report.
- Tested selected soil samples for a broad range of analytes (by a National Association of Testing Authorities (NATA) accredited laboratory).

Reporting

- Prepared this SCA to document the assessment activities and results to provide findings and recommendations relevant to the objectives of the assessment.
- Compiled a Conceptual Site Model (CSM) for the site, identifying complete and potential pathways between known and potential sources and receptors. This CSM is incorporated in this investigation report.

2 Previous Investigations

2.1 Preliminary Site Investigation and Contamination Assessment

A previous DP Report [1] was undertaken within the proposed Stages 1-14 and immediate surrounds of the Radcliffe, Wyee site. The report was preliminary in nature and included the following:

- Twenty-four (24) test bores advanced across the site using a Ute mounted continuous push tube sampling rig. Systematic environmental samples were taken at select locations.
- Identification of potentially contaminating activities that are currently or had previously been undertaken on site.
- Identification of potential contaminant concerns.
- Production of preliminary site contamination assessment.
- Assessment of need for further contamination specific investigations.

The DP Report [1] concluded that the contamination risk across the Site was generally ‘low’. However, though anecdotal evidence, it was suggested that several areas of concern existed within the Stage 1-4 area.

A majority of the risks were identified as being outside the Stage 5-14 area, with the exception of 0.4ha area within Lot 212 DP866437 flagged as an ‘area of concern’. The area was flagged due to geomorphic features resembling that of a former small-scale quarry.

Further contamination assessment was recommended at Lot 212 DP 866437, with the purpose being to quantify the level of contamination (if any) and delineate contaminated areas in order to facilitate the preparation of a Remediation Action Plan (RAP) if required.

Areas of environmental concern associated with Stages 1-4, were assessed and remediated separate to the current assessment presented herein.

3 Site Inspection and Surrounding Environment

3.1 Site Identification

The subject site details are presented in **Table 3-1**. For site location, please refer to **Figure 1** in **Appendix A**.

Table 3-1 Site Details

Site Address	Hue Hue Road & Bushells Ridge Road, Wyee
Lot Number and Deposited Plan	Lot 173 DP 1212974 & Lot 212 DP 866437
Site Area	Approx. 94ha
Local Government Area	Lake Macquarie
Relative Zoning (LZN_007) (Lake Macquarie Local Environmental Plan [2])	▪ Lot 173 DP 1212974 zoned as: – E2 Environmental Conservation; – E3 Environmental Management; and – R2 Low Density Residential ▪ Lot 212 DP 866437 zoned as: – E2 Environmental Conservation – R2 low Density Residential

3.2 Site Features and Observations

Table 3-2 Site features and Observations

Item	Observations
Site use	▪ Residential and agricultural (grazing) land uses.
Weather condition	▪ Sunny, showers the previous night. Significant dry spell spanning 6-8 weeks prior to investigation.
Site slope and drainage features	▪ Topographically the site is located within regionally hilly terrain, locally characterized by predominantly north and east facing slopes. The dominant north and east facing slopes fall from an east west trending ridgeline on which Bushells Ridge Road has been constructed. A less dominant west facing slope is located in the eastern portion of the site and falls from the site boundary towards the Unnamed Creek. ▪ Slopes within the site generally fall to the north and east towards Manning Creek and an Unnamed Creek respectively. The Site has slight hills predominantly ranging from 1-6%, with slopes decreasing to the north. ▪ Drainage across the site appears to be comprised of infiltration and / or surficial runoff following the existing contours of the site towards Manning Creek in the north, the Unnamed Creek to the east and several rural dams within the western portion of the site. ▪ The highest point of the Site was located along the southern boundary, where existing residential building within Lot 212 DP866437 is located. ▪ Lake Macquarie Council's Catchment and Flood Study Map [3] indicates that the Site is not affected by flooding. However, due to presence of two creek lines

Item	Observations
	some localized flooding may occur in proximity to these water bodies.
Nearby Water Bodies	▪ Mannering Creek traverses east to west within the northern portion of the Site. ▪ The unnamed creek traverses south to north through the eastern third of the Site. ▪ Three temporary dams are located within proposed Stages 8 and 9. The dams range in size from 0.05ha to 0.12 ha and all contained varying amounts of standing water at time of investigation. ▪ A fourth temporary dam was located in the northern portion of the site. The dam was approximately 0.02 ha in size and contained no standing water at the time of investigation. ▪ Potential dam or waterhole in the former stockyard located in the southeastern corner of the Site. Possibly linked to the southern point of the unnamed creek.
Site surface coverings	▪ Areas of open pasture hroughout the Site. ▪ Woodland/shrub region around the unnamed creek. ▪ Approx. 10ha of open woodland surrounding existing residence in southwest portion of the site.
Surface soils	▪ Natural sandy topsoil over the majority of the Site.
Site cut and fill	▪ Cutting has occurred in the excavated area in former Lot 212 DP 866437.
Buildings	▪ Rural residential property, three storage containers, and approx. four storage sheds within former Lot 212 DP 866437.Storage containers were constructed of steel while sheds comprised predominantly of metal cladding and timber frames. ▪ A recently constructed water facility within the northern portion of the Site.
Potential asbestos in building materials	▪ None evident
Manufacturing, industrial or chemical processes and infrastructure	▪ None evident
Fuel storage tanks (USTs/ASTs)	▪ None evident
Dangerous goods	▪ None evident
Solid waste deposition	▪ Solid waste present within former Lot 212 DP 866327. Solid waste comprised predominantly of recycled building materials and automotive vehicles / parts. Solid waste appeared to be inert.
Liquid waste disposal features	▪ None evident
Evidence of previous site contamination investigations	▪ Area of concern presented in DP Report as Lot 212 DP 866437, thought to be quarried area.
Evidence of land contamination (staining or odours)	▪ None evident
Evidence of groundwater contamination	▪ None evident
Groundwater use	▪ None evident

Item	Observations
Vegetation	▪ Primarily grasses and reeds. Mature trees and shrubs located around the unnamed creek.
Site fencing	▪ Rural wire fencing along the boundaries of the Site. Former agricultural stockyard in the south eastern corner of the site, bordered by rural fencing.
Additional Notes and Observations	▪ Excavated area (area of concern) was deemed to be a borrow pit rather than a former quarried area based on site knowledge decreasing the likelihood of contamination. ▪ Solid waste (as above) including old vehicles/machinery in Lot 212 DP 866437.

3.3 Surrounding Environment and Land Uses

The site is located in the semi-rural area of Wyee. Land uses around the site are detailed in **Table 3-3**.

Table 3-3 Surrounding Land Use

Direction	Land Use or Activity
North	Construction of Stage 1-4, Mannering Creek and residential properties.
West	Bushland with intermittent cleared areas and residential properties.
East	Some bushland and higher density residential properties.
South	Bordered by Bushells Ridge Road, with bushland opposite.

4 Published Data

4.1 Regional Geology

Reference to the Gosford-Lake Macquarie 1:100 000 Geology Map indicates that the Site is directly underlain by rocks of the Tuggerah Formation (Rnu). The Tuggerah Formation comprises of Early Triassic deposits of grey to green-grey laminate, red-brown claystone and siltstone, interbedded with fine-to-medium-grained green-grey sandstone and soils derived from the weathering of these rock types. The eastern portion of the site (DP [1] identified area of 'weak soil' shown in **Figure 1** attached in **Appendix A**) is directly underlain by quaternary gravel and sand (Qa).

Reference to the Central Coast Area Coastal Quaternary Geology Map 1:100 000 indicates that the site is predominantly underlain by The Narrabeen Group, with some minor quaternary valley fill (Qav) seams associated with previously mentioned creek lines.

4.2 Acid Sulfate Soils

Review of the Department of Land and Water Conservation Acid Sulfate Soil Risk Maps indicated that the site is situated within an area of no known occurrence.

Further review of Lake Macquarie Council Environmental Plan (LEP) 2014 [4] Acid Sulfate Soils Risk Map shows the site is situated within Class 5 Acid Sulfate Soils (ASS). Class 5 soils indicate and ASS soils assessment is required for works within 500 m of a Class 1, 2, 3 or 4 land that is below 4m AHD and by which the water table is likely to be lowered below 1.0 m.

While the site does not trigger an ASS based on council guidelines, preliminary testing presented in previous DP Report [1], indicated potential for presence of ASS within the topsoil materials across the site. As such,

detailed ASS testing of selected topsoil material across was undertaken to quantify potential presence (if present) of ASS.

4.3 Hydrogeology

A search of the NSW Groundwater Database from Department of Primary Industries – Office of Water NSW, identified one (1) bore within a 1 km radius of the Site. The bore is summarised in **Table 4-1**.

Table 4-1 Registered Groundwater Bore Search Summary

Well Number	Intended Purpose	Coordinates (UTM)	Depth of Bore (m)	SWL (m)	Water Bearing Zone (m)	Proximity to Site (m)
GW064662.1.1	Water Supply	359443.13 E 6327027.6 N	24.00	-	-	900 m south east

4.4 EPA Records Search

4.4.1 Contaminated land Record of Notices

A search of NSW EPA Record of Notices on 19th September 2018 revealed no notices listed within 1 km of the site.

4.4.2 PoEO Public Register

The PoEO Public Register under Section 308 of the Protection of the Environment Operations (PoEO) Act 1997 contains Environment Protection Licences (EPLs), applications and notices issued by the EPA.

The Public Register was searched on the 19th September 2018 to identify any issues of relevance to the Site. The search revealed no licensed activities within a 1 km radius of the site.

5 Site History

The site history comprised the review of available published data and information presented previous DP Report [1]. Reiteration of data presented in previous Report [1] and additional site history review is detailed herein.

5.1 Personnel Familiar with the Site

As part of the site history interviews with individuals familiar with the site were conducted.

5.1.1 Interview with Mr George Salvestro 14th August 2018

The site owner Mr George Salvestro was interviewed onsite as he is the current resident of the Dwelling on Lot 212. Mr Salvestro indicated that apart from the use of chemicals for normal residential gardening and maintenance activities no broad scale use or application of chemicals or storage of fuels was conducted on the site. Mr Salvestro indicated that he had previously operated a development and construction business prior to retiring

5.1.2 Interview with Mr Ian Piper (Cardno) 1st October 2018

Discussions with Mr Piper confirmed that the excavation areas in Lot 212 of weathered rock was undertaken to win material for the purposed surfacing of existing onsite tracks and use as imported filling on a Saltro development project in Jilliby in the mid 1990's. As such the "quarried area" described by the DP Report was not a commercial quarry with a minor risk of contamination. The excavation process involved the removal of surficial soils to stockpile, which were still evident prior to excavation of the underlying weathered rock profile.

5.2 Review of the Historical Aerial Photos

Cardno has conducted a review of the descriptions and available historical aerial photograph data presented in previous DP Report [1]. Overall, Cardno's historical aerial review was generally consistent with the interpretation and conclusions associated with the data presented in DP Report [1].

Table 5-1 Douglas Partners Historical Aerial Photos (2007)

Date	Reference	Observations
1954	Black and white photography	**Onsite:** The 1954 aerial photograph indicates that the site is predominantly vegetated with bushland. **Offsite:** The majority of the properties to the north adjacent to Hue Hue Road appeared to be partially cleared of the bushland vegetation with rural (orchard) land uses identified. Areas adjacent Gorokan Road had been partially cleared of the bushland vegetation, although no orchard or intensive agricultural land use were identified. The area identified as the “Former Cricket Pitch” was cleared and appeared to have a grass surface cover. A dam was identified between the “Former Cricket Pitch” and Gorokan Road.
1965	Black and white photography	**Onsite:** An overview of the 1965 aerial photograph indicates that clearing of bushland within the site has occurred compared to the 1954 photograph. **Offsite:** An orchard land use in the area off Gorokan Road between Warapara and Pirama Roads. Surrounding land uses appeared to have remained relatively unchanged although the density of development in surrounding areas has continued to increase.
1975	Black and white photography	**Onsite:** Further clearing of bushland has occurred compared to the 1961 photograph within Lot 17 DP 870597 (now Lot 173 DP 1212974), and appearing to have a grass surface cover (similar to its current condition). **Offsite:** Several large buildings including four elongated shed were identified to the north west (part of Lot 17 DP870597). The aerial photographs and anecdotal information indicated this property had poultry farm land use. The density of development in surrounding areas has continued to be increase.
1985	Black and white photography	**Onsite:** An overview of the 1985 aerial photograph indicates that the site had similar physical features to the 1975 photograph, **Offsite:** Additional buildings (probably dwellings) are visible in areas adjacent to Gorokan and Hue Hue Roads. The formerly identified orchard land uses appeared to have generally ceased, although a small number of trees were visible on two of the previously identified parcels of land.
1994	Colour photography	**Onsite:** Generally consistent with the 1985 photograph. **Offsite:** Generally consistent with the 1985 photograph, although additional buildings (probably dwellings) are visible in areas adjacent to Gorokan and Hue Hue Roads. There is an overall increase in density of development around the site.
2007	Colour photography	**Onsite:** Generally consistent with the 1994 photograph. **Offsite:** Generally consistent with the 1994 photograph with the exception of the construction of greenhouses to the north of Stage 5-14.

The DP review of the available historical aerial photographs and data indicated that no major disturbance was noted within the subject Site with the exception of an excavation area located within Lot 212 DP866437, referred to as “quarried area”.

As the DP aerial review was restricted to 2007, Cardno have undertaken aerial review of available Google Earth and Nearmap Imagery post 2007. A summary of the observed site features detailed in the Cardno reviewed aerial imagery are summarised below.

Table 5-2 Aerial Imagery Review

Date	Reference	Observations Stages 5-14
2010	Colour Nearmap	Onsite: Stage 5-14 generally consists of undeveloped agricultural land. Bushland is located within the southern western portion of the site. Two dams of similar size (0.1 ha) are present along the western boundary of the site, north of the bushland. Trees and shrubs are present along the Mannering Creek line which runs east to west across the northern portion of the site. A concentration of trees and shrubs are also present along the Unnamed Creek that runs south to north through the eastern portion of the site. An internal road runs from the southern boundary of the site to the northern boundary in a north-north west direction. Lot 212 DP 866437 comprises of open woodland, with a residential building located in the central area. A cleared area (1.5 ha) exists directly north west of the residential building. Bushells Ridge Road borders the southern boundary of the site. Offsite: The area predominantly comprises low-density residential development. The Paper Subdivision can be seen situated to the west.
2014	Colour Nearmap	Onsite: Generally consistent with the 2010 photograph detailed above. With the exception of an access track off Bushells Ridge Road from the south to the northern boundary. Offsite: Generally consistent with the 2010 photograph detailed above.
2016	Colour Nearmap	Onsite: Generally consistent with the 2014 photograph detailed above. With the exception of the construction of the waste water management station. Offsite: Generally consistent with the 2014 photograph detailed above. With the exception buildings to the north demolished to accommodate Stage 1-4 road pavements and residential lots.

5.3 Summary of Site History

Based on the available data and review of the Douglas Partners report [1], the subject Site has been predominately used for agricultural (i.e. grazing) purposes and no major disturbance was present with the exception of an excavation area located within Lot 212 DP866437, identified as “quarried area” within the Douglas Partners report [1]. Excluding the identified “quarried area”, the areas of concern detailed within the DP report are outside the subject Site.

Historical review indicates that subject site is not located within areas of potential contamination sources and the subject site has a low risk of contamination due to the identified areas located beyond the subject site.

For further information regarding past assessments and available data, refer to the DP Report [1].

6 Criteria for Contamination Assessment

The soil assessment criteria used to evaluate soil analytical results are based on the National Environment Protection Measure (NEPM) Assessment of Site Contamination, 2013 [5]. Table 5A of NEPM Schedule B(1) provides Tier I screening values for contaminants based on the protection of human and environmental health for various land uses.

Based on the proposed use of the site and the proximity of the existing creek, the following criteria have been adopted:

- Health Investigation Levels (HIL's) "Residential A", includes residential with gardens/accessible soils;
- Soil Health Screening Levels (HSL) for vapour intrusion recommended for Residential (HSL A);
- Ecological Screening Levels (ESLs) for TPH fractions F1-F4, Benzo(a)Pyrene in soil for Urban Residential and Public Open Space; and
- Ecological Investigation Levels (EILs) for Urban Residential/Public Open Space limits. The thresholds adopted are from Table 1(B)(1) to 1(B)3 NEPM 2013 and are based on pH results of the site soils (4.1), CEC (0.63) and/or % clay content testing (15%). EILs were calculated using 25th percentiles of the ABC data for the 'old suburbs' of Olszowy et al. (1995) as recommended by NEPM (schedule B5c)
- Aesthetic issues generally relate to the presence of low-concern or non-hazardous inert foreign material (refuse) in soil or fill resulting from human activity. Sites that have been assessed as being acceptable from a human health perspective may still contain such foreign material.

"Investigation levels" or "screening levels" presented in the NEPM are not intended to be interpreted as "maximum permissible levels", "clean up levels" or "safe levels", rather, they are levels at which further investigation or assessment should be undertaken to provide assurance that unacceptable contamination does not occur to an extent that could cause harm or detriment for users of the land. Subsequent assessment on a site-specific basis often results in higher levels being acceptable. However, since the "investigation levels" or "screening level" are generally set at conservatively low levels, they are often taken to be the acceptable levels.

A conservative approach was adopted as stipulated by NEPM [2]. Soils identified during the Site inspection and sampling were silty / sandy clays, silts and sands. Based on the observed soil type/s, the ESL's for coarse soils and HIL's for sand soils have been adopted to follow NEPM [2] guidelines.

Table 6-1 Health-based and Ecological Assessment Criteria

Chemical	Unit	HIL A & HSL A	EIL UR/POS & ESL UR/POS
Arsenic – As	mg/kg	100	100
Chromium ^{III} – Cr ^{III}	mg/kg	-	410[1]
Cadmium – Cd	mg/kg	20	
Copper – Cu	mg/kg	6000	30[1]
Lead – Pb	mg/kg	300	1100
Nickel – Ni	mg/kg	400	5[1]
Zinc – Zn	mg/kg	7400	95[1]
Mercury – Hg	mg/kg	40	-
Endrin	mg/kg	10	-
Heptachlor	mg/kg	6	-
Hexachlorobenzene	mg/kg	10	-
Methoxychlor	mg/kg	300	-
Chlorpyrifos	mg/kg	160	-
Mirex	mg/kg	10	-
DDT	mg/kg	-	180
Total PAH's	mg/kg	300	-
Naphthalene	mg/kg	3	170
Benzene	mg/kg	0.5	50
Toluene	mg/kg	160	85
Ethylbenzene	mg/kg	55	70
Xylene total	mg/kg	40	105
C_{10} – C_{14}	mg/kg	-	120
C_{10} – C_{16}	mg/kg	-	120
C_{16} – C_{34}	mg/kg	-	300
C_{34} – C_{40}	mg/kg	-	2800
F1 > C_6 – C_{10} (less BTEX)	mg/kg	45	180
F2 > C_{10} – C_{16} (less naphthalene)	mg/kg	110	-
Benzo(a)pyrene	mg/kg	-	0.7

[1] Values have been adjusted for EIL UR / POS based on tested pH, CEC and clay content values, calculations can be found in **Appendix C.**

7 Investigation Methodology

7.1 Supplementary Contamination Assessment

The site investigation relevant to the SCA was conducted on the 24th of August 2018 by a Geotechnical Engineer from Cardno.

Cardno's contamination assessment comprised the following:

- A site walkover and visual inspection by a geotechnical engineer from Cardno including site mapping and logging of significant site features.
- Excavation of ten (10) test pits (TP101 – TP110) across Stage 5-14 utilising a 3.5 tonne excavator fitted with a 400 mm toothed bucket. Test pits were excavated to a target depth of 0.6 m.
- Excavation of five (5) test pits (TP201- TP205) within the excavated area (0.4 ha) of former Lot 212 DP 866437 utilising a 3.5 tonne excavator fitted with a 400 mm toothed bucket. Test pits were excavated to a target depth of 0.6 m.
- Samples were collected at three (3) interval depths (0.10 m, 0.25 m & 0.50 m bsl) at each test location
- Samples were collected via a stainless steel trowel following the preparation of a fresh side wall of each test pit and all sampling equipment decontaminated using Decon 90 solution between each sampling event.

7.2 Laboratory Testing

Laboratory testing on selected samples recovered during fieldwork comprised the following:

- Ten (10) samples from Stage 5-14 and five (5) from Lot 212 DP866437 were analysed for Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethyl-benzene, Xylenes and Napthalene) BTEXN, Polyaromatic Hydrocarbons (PAH), organochlorides pesticides (OC), organophosphates (OP), Polychlorinated Biphenyls (PCB) and eight metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn).
- Two (2) sample from Stage 5-14 and five (5) samples from former Lot 212 DP866437 were analysed for the presence of asbestos.
- One (1) sample from Stage 5-14 to be tested for pH, clay content (%) and CEC.
- Two (2) duplicate samples were taken from the Site, with one (1) from the Stage 5-14 area and one (1) from the excavated area of former Lot 212 DP866437 were analysed for TRH, BTEX, PAH, OC, OP, PCB and eight heavy metals.
- One (1) rinsate sample analysed for TRH and BTEX.

Laboratory analysis and testing was carried out on soil samples by SGS Australia Pty Ltd, which holds current accreditation with the National Association of Testing Authorities, Australia (NATA) for the analysis performed.

Results of laboratory testing are in the laboratory reports attached in **Appendix C**.

7.3 Sampling Methodology and Decontamination Procedures

Environmental sampling was performed according to Cardno standard operating procedures with sampling data recorded on Chain of Custody sheets.

The methodology utilised is as follows:

- The use and changing of disposable gloves between each sampling event to prevent cross contamination;
- Decontamination of all sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to each sample being taken;

- The environmental samples from test pits were collected either, by hand where possible or collected using a stainless steel trowel.
- Soil samples were placed into glass jars with a Teflon lined lid supplied by SGS laboratories;
- To minimise the potential for volatile contaminants loss, the glass jars were filled to have zero headspace;
- Collection of a blind duplicate sample at a frequency of 20% for quality assurance and control (QA/QC);
- Samples were sent to the laboratory with recommended holding times; and
- The sample jars were preserved in a chilled esky containing ice immediately after sampling and during transport to the laboratory. Samples were shipped to the laboratory under Chain-of-custody (COC) protocols. The completed COC accompanied the samples during shipment to the laboratory and copy of is provided in **Appendix C**).

The samples were collected at the intrusive testing locations as shown on **Figure 1**, attached in **Appendix A.**

7.4 Quality Control/Quality Assurance

A critical aspect of site investigation is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process, which includes a review of the following aspects of the data collection process as detailed in QA/QC Report, attached in **Appendix D**.

- Project Quality Objectives and Plans.
- Data Representativeness.
- Data Precision and Accuracy.
- Laboratory Performance.
- Data Comparability.
- Data Set Completeness.

1.1 Laboratory QC and QCI Report Summary

The laboratory selected for undertaking the analysis SGS is NATA accredited for the analysis required, and undertook certain QA/QC requirements to demonstrate the suitability of the data that is obtained. The laboratory is required to undertake and report internal laboratory Quality Control (QC) procedures for all chemical analysis undertaken. The QC testing is required to include:

- Laboratory duplicate sample analysis at the rate of one duplicate analysis per twenty samples;
- Method blank at the rate of one method blank analysis per 20 samples;
- Laboratory control sample at the rate of one laboratory control sample analysis per 20 samples; and
- Spike recovery analysis at the rate of one spike recovery analysis per 20 samples.

Compliance with the laboratory QA/QC requirements **and non-conformance details are discussed in the internal Laboratory QA/QC reports included with the certificates of analysis in Appendix C.**

The QA/QC Report received by SGS (in **Appendix C**) highlights outliers flagged in the Quality Control Report and Holding Time breaches and breaches in the Frequency of Quality Control Samples. Review of the QA/QC documentation provided by SGS, indicates that two outliers existed which are summarised in **Table 7-1.**

Table 7-1 Laboratory QA/QC Outlier Summary

Sample ID	Analyte	Description
TP103 0.1	Soil pH	Exceeded holding time – Extraction due 31st August, 2018. Extracted 3rd September, 2018. See lab report in **Appendix C**.

These times are recommendations only and as samples were refrigerated/chilled adequately at all stages between sampling and analysis this non-compliance is not considered significant. Cardno concludes that the data reported by the NATA accredited SGS as presented in this SCA is suitable for interpretative purposes and to make conclusions/recommendations regarding Site contamination.

It was considered that the field and laboratory QA/QC criteria were generally within acceptable limits indicating field sampling, storage, handling, and decontamination procedures and laboratory preparation and analysis procedures were adequate for the purposes of the environmental investigation. Therefore, the data set used as the basis for the soil assessment is considered valid and complete.

8 Areas and Contaminants of Potential Concern

The assessment has identified several potential sources of contamination (and related Contaminants of Potential Concern – COPC), which are summarised in **Table 8-1**. The locations of these areas of interest on the site are identified in **Appendix A.**

Table 8-1 Site Activities and Potential Contaminants of Concern

Environmental Assessment Area	Site Activity/Potential Source	Contaminants of Potential Concern	Comments
Lot 212 DP 866437	Excavation/borrow pit (0.4 ha area within Lot 212 DP866437)	▪ Total Petroleum Hydrocarbons (TPHs). ▪ BTEX (benzene, toluene, ethyl benzene, and xylenes). ▪ Polyaromatic Hydrocarbons (PAHs). ▪ 8 heavy metals.	▪ Potential for contamination from extraction activities/machinery use.
	Vehicle/machinery use	▪ Total Petroleum Hydrocarbons (TPHs). ▪ BTEX (benzene, toluene, ethyl benzene, and xylenes). ▪ Polyaromatic Hydrocarbons (PAHs).	▪ Potential for contamination from the transport of extracted materials from the excavated site.
	Storage structures	▪ Organochlorine and Organophosphate Pesticides (OCP/OPP), Herbicides ▪ Total Petroleum Hydrocarbons (TPHs). ▪ BTEX (benzene, toluene, ethyl benzene, and xylenes). ▪ Polyaromatic Hydrocarbons (PAHs). ▪ Foreign materials ▪ Asbestos	▪ Potential for contamination from leaks of pesticides/fuels for vehicles machinery ▪ Old vehicles/machinery around the site.
	Solid waste	▪ Foreign materials ▪ Asbestos	▪ Potential building and household refuse scattered throughout surrounding bushland.
Stage 5-14 (part of Lot 173 DP1212974)	Historic farming practices using herbicides and pesticides	▪ Organochlorine and Organophosphate Pesticides (OCP/OPP/Nutrients/Fertilizers), Herbicides	▪ Previous agricultural activities on-site. ▪ Surficial soils would most likely be affected.
	Agriculture operation and maintenance	▪ Total Petroleum Hydrocarbons (TPHs). ▪ BTEX (benzene, toluene, ethyl benzene, and xylenes). ▪ Polyaromatic Hydrocarbons (PAHs). ▪ 8 heavy metals. ▪ Asbestos	▪ Potential exists for fuels and chemicals used in the operation and maintenance of agricultural operations. ▪ The presence of contamination would likely be associated with localised spills associated with farm vehicles and road traffic.

9 Laboratory Analytical Results

9.1 Analytical Tables

Analytical testing was carried out on soil samples using SGS Australia Pty Ltd, which holds current accreditation with the National Association of Testing Authorities, Australia (NATA) for all testing undertaken. All testing was undertaken within the terms of their accreditation. Copies of the testing laboratory reports are shown in **Appendix C**. The results of laboratory analysis for inorganic and organic contaminants in the soil samples are summarised in the analytical comparison tables attached in **Appendix C.**

9.2 8 Heavy Metals

The concentration of metals within the samples tested were below the Residential A (HILs) threshold limits, with the exception of TP203 0.4-0.5.

Results at TP203 0.4-0.5 indicated an exceedance of zinc (Zn) (150 mg/kg) above the calculated threshold limits (95mg/kg) as detailed in NEPM for the Assessment of Site Contamination, 2013 [4] for Urban Residential/Public Open Space (EILs). In accordance with NEPM [2], the following was calculated:

- TP201-TP205 UCL_{mean} = 102.1 mg/kg
- TP201-TP205 standard deviation = 48.5 mg/kg

Summary statistics can be found in **Table 9-1**.

Table 9-1 TP201-TP205 Zinc Summary Statistics

Zn	Results
Number of Samples	6
Investigation Level	95 mg/kg
Minimum	11 mg/kg
Maximum	150 mg/kg
Range	139 mg/kg
Arithmetic Mean	62.1 mg/kg
95% Upper Confidence Level	102.1 mg/kg
Standard Deviation	48.5 mg/kg

9.3 Total Petroleum Hydrocarbons (TPH)

TPH concentrations in all samples were below the Residential A (HSLs) and Urban Residential and Public Open Space (ESLs) threshold limits.

9.4 Benzene, Toluene, Ethylbenzene, Xylene and Naphthalene (BTEXN)

BTEXN concentrations in all samples were below the Residential A (HSLs) and Urban Residential and Public Open Space (ESLs) threshold limits.

9.5 Polycyclic Aromatic Hydrocarbon (PAH)

PAH's concentrations in all samples were below the Residential A and Urban Residential and Public Open Space (ESLs) threshold limits.

9.6 Organophosphorous and Organochlorine (OP/OC) & Polychlorinated Biphenyls (PCB) Compounds

OC/OP/PCB concentrations returned values below the reporting limits in all samples and were below the Residential A (HSLs) and Urban Residential and Public Open Space (EILs) threshold limits.

9.7 Asbestos Identification in Soils

No asbestos fibres were detected in any sample analysed. Potential asbestos bearing materials were not observed during the Site inspection or within intrusive field investigation.

10 Conceptual Site Model

10.1.1 General

Generally, a conceptual site model (CSM) provides an assessment of the fate and transport of COPCs relative to site-specific subsurface conditions with regard to their potential risk to human health and the environment. The CSM takes into account site-specific factors including:

- Source(s) of contamination,
- Identification of contaminants of potential concern (COPCs) associated with past (and present) source(s),
- Vertical, lateral and temporal distribution of COPCs,
- Actual or potential receptors considering both current and future land use for both the site and adjacent properties, and any sensitive ecological receptors.

10.1.2 Source of Contamination

A small (approx. 7 m^3) stockpile of material in the borrow pit area within Lot 212 DP 866437 (onsite).

10.1.3 Media Potentially Impacted

The media impacted by contamination includes:

- Soil.

10.1.4 Summary of Contaminated Exposures

A summary of the potential source-pathway-receptor (pollutant) linkages with respect to ecological health is found in **Table 10-1**. This indicates the potentially active pathways of exposure of people to contamination at the site.

Table 10-1 Summary of Contaminated Exposures

Sources	Pathways	Receptors
Zn concentration in stockpile (Lot 212 DP 866437)	Leaching from stockpile to surrounding soil	▪ Ecological/natural resources
	Dispersion via erosion	▪ Ecological/natural resources
	Dispersion via wind	▪ Ecological/natural resources

10.1.5 Data Gaps and Uncertainties

Based on the inspection, intrusive sampling, comparison of the analytical testing undertaken to threshold limits detailed in NEPM [5], the potential contamination at this site is not considered to present a significant constraint on the proposed development of the site. However, it must be noted that the number of sampling locations recommended by the NSW EPA Sampling Design Guidelines (1995) for a site of this size was reduced with limited intrusive sampling undertaken to support the results or conclusions of the previous DP Report.

The following data gaps and uncertainties regarding the assessment are detailed below:

- Limited intrusive sampling was undertaken;
- No groundwater samples were collected however; groundwater contamination is considered unlikely.

11 Discussions

This report presents the findings of the SCA undertaken on Stage 5-14 (part of Lot 173 DP1212974) and Lot 212 866437, Bushells Ridge Road, Wyee, NSW. The assessment aimed to address the objectives outlined in **Section 1.2** of this report and are listed below:

- Provide additional environmental data to assess potential issues previously identified in Douglas Partners Preliminary Site Investigation and Contamination Assessment Report (JN. 41810, date. July 2009) [1].
- The potential for the previous site activities or activities on adjacent sites to act as a source of contamination.
- The nature and location of contamination of soil on-site and potential for contamination extending off-site.
- Determine the sites suitability for the proposed use (urban residential)
- Assess the need for any further assessment or remedial works before definitive conclusions could be made on the suitably of the site for use.

11.1 Potential Acid Sulfate Soil

Douglas Partners undertook a preliminary ASS assessment (DP Report [1]) and concluded that ASS soils were unlikely to be present within the greater Radcliffe, Wyee development and more specifically Stages 5-14 and Lot 212 DP 866437. The conclusion was based on field screening results, risk maps and existing site elevations.

11.2 Soil Contamination

A limited intrusive sampling and testing regime has been undertaken to provide this supplementary assessment to the DP Report [1] and assess potential issues identified by the desktop study.

11.2.1 Borrow Pit Area (Lot 212 DP 866437)

As the Site was not subject to commercial quarrying activities described by the DP Report [1], risk of contamination was considered to be decreased.

No indication of staining or olfactory indication of contamination, nor fibrous sheeting or foreign materials were observed within the test pits or the surface of the Site at the time of inspection.

With the exception of Foreign materials were found in one test pit (TP203) within Lot 212 DP 866437, which was comprised of fill material. Small amounts (<12% of the sample) of metal tubing, tile and brick fragments were present. However, no olfactory indication nor fibrous sheeting was noted. Appraisal of the laboratory results indicates the absence of asbestos fibres within the samples analysed.

Based on the findings of this SCA, site conditions and comparison of the analytical results of the testing undertaken to HSL and HIL threshold limits (Residential A) detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [5] no indication of gross contamination has been identified on the site.

Screening values for EILs were calculated according to site specific conditions in accordance with NEPM [5]) for Urban Residential and Public Open Space guidelines. With the exception of one (1) exceedance at sample location TP203 0.4-0.5 (150 mg/kg), which exceeded the calculated threshold of 95 mg/kg.

In accordance with NEPM [5] the 95%UCL_{mean} (102.1 mg/kg) and standard deviation (48.5 mg/kg) were calculated. As the standard deviation is more than 50% of the calculated EIL Zn level (95 mg/kg), the -stockpile is considered to be non-representative of site conditions and should be removed prior to development.

Based on the field assessment, and laboratory results, following removal of this stockpile and exclusion of the associated data from the analysis, Cardno considers that Lot 212 DP 866437 does not represent a risk to human or environmental health, however it is recommended that if redevelopment is to occur at the site, the

soil located at TP203 is classified and transported off-site to a licenced landfill or re-used on-site at a depth of greater than 2 m.

11.2.2 Stage 5-14 (Lot 173 DP 1212974)

No indication of staining or olfactory indication of contamination, nor fibrous sheeting or foreign materials were observed within the test pits or the surface of the Site at the time of inspection.

Based on the findings of this SCA, site conditions and comparison of the analytical results of the testing undertaken to HSL and HIL threshold limits (Residential A) detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [5] no indication of gross contamination has been identified on the site.

Based on the findings of this SCA, site conditions and comparison of the analytical results of the testing undertaken to ESL and EIL threshold limits (Urban Residential/Public Open Space) detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [5] no indication of gross contamination has been identified on the site. Cardno considers that Lot 173 DP 1212974 has no evidence of contamination that should preclude the site from the proposed development in Stages 5-14.

12 Conclusions and Recommendations

12.1 Conclusions

Following on from the original DP report, broad scale testing was undertaken across the Site. Based on site history, current site inspection, knowledge of the site and the limited site investigation, no indication of gross contamination was identified. The isolated stockpile located at Lot 212 DP 866437 appears to be the only source of contamination on the Site. Therefore, the Site is considered to be low risk of potential contamination based on investigation findings and the identified data gaps.

12.2 Recommendations

Based on the conclusions above, Cardno recommends:

- Any soil proposed to be excavated and transported off site for disposal should be classified in accordance with the NSW EPA Waste Classification Guidelines.
- If construction occurs at Lot 212 DP 866437, it is recommended that the contaminated stockpile (**Figure 1, Appendix A**) should be classified and transported off site for disposal in accordance with the NSW EPA Waste Classification Guidelines.
- Minor inert foreign materials were observed across the site. The removal of these materials can be undertaken at a stage by stage basis.
- Validation soil sampling may be required if deemed necessary
- An unexpected finds protocol should be developed and adopted to address any potential contamination that may arise during development.
- Confirmation testing of asbestos within structures or a hazardous material assessment be conduct prior to any demolition.

13 Limitations

This investigation has been undertaken in general accordance with the current "industry standards" for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

- National Environment Protection Council (NEPC) (1999) *National Environment Protection (Assessment of Site Contamination) Measure*, as amended (registered on 15 May 2013) [5]. This is referred to from here on as "the NEPM" or "NEPM (2013)".
- Standards Australia (2005) *AS4482.1- 2005: Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds*. [6].
- NSW EPA "*Guidelines for Consultants Reporting on Contaminated Sites*" [7].

The agreed scope of this investigation has been limited for the current purposes of the Client. The investigation may not identify contamination occurring in all areas of the site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained.

This site investigation report is not any of the following:

- An Environmental Audit Report as defined under NSW Site Auditor Scheme [8].
- A detailed site investigation (DSI) report sufficient for an Environmental Auditor to be able to conclude a statutory or non-statutory environmental audit.
- A geotechnical report, and the bore logs or test pit logs may not be sufficient as the basis for geotechnical advice.
- A detailed hydrogeological assessment or an assessment of groundwater contaminants potentially arising from other sites or sources nearby.
- A waste classification report of soil analytical results from the Site.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more of the beneficial uses of land set out in State Environmental Protection Policy (Prevention and Management of Contamination of Land) and its variation.

14 References

[1] Douglas Partners, “Report on Preliminary Geotechnical and Contamination Assessment,” July 2009.

[2] NSW Government, “Lake Macquarie Local Environmental Plan - Land Zoning,” 2014.

[3] NSW Government, “Lake Macquarie Local Environmental Plan - Flood Planning,” 2014.

[4] NSW Government, “Lake Macquarie Local Environmental Plan - Acid Sulfate Soils Risk map,” 2014.

[5] National Environment Protection (Assessment of Site Contamination) Measure 1999, “Schedule B1 Guidelines on Investigation Levels For Soil and Groundwater,” National Environment Protection Council (NEPC), 16 May 2013.

[6] Standards Australia, “Australian Standard - Guide to the investigation and sampling of sites with potentially contamainted soils - PArt one: Non-volatile and semi-volatile compounds,” Standards Australia, 2005.

[7] NSW EPA, “"Contaminated Sites: Guidelines for Consults on Contaminated Sites,” NSW Environmental Protection Authority, 1997.

[8] NSW DEC, “Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd Edition),” Department of Environment and Conservation NSW, 2017.

APPENDIX A

FIGURES

NOTES:
Image underlay adapted from client supplied plans and nearmaps aerial imagery.

LEGEND:

TPXXX Approximate test pit locations and numbers.

Approximate site boundary

NORTH

TP101
TP102
TP103
TP104
TP105
TP106
TP107
TP108
TP109
TP110

Enhanced View of "Quarry Area" Testpits

TP201
TP204
TP205
TP203
TP202

Lot 212
DP 866437
Site Boundary

Stages 5-14
Overall Site
Boundary

Sample	Zn
EIL (calculated using CEC, clay content and pH values)	95
TP203	150

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Drawn HS	Date 6.09.2018	
Checked	Date	
Designed	Date	
Verified	Date	
Approved		

Client: Wyee Land Pty Ltd

Project: Supplementary Contamination Assessment
Radcliffe, Wyee Development
Wyee

Title: Sample Location Plan

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Project Number	Scale	Size
82219014		A3

Figure Number: Figure 1

Revision: A

DATE PLOTTED: 11 October 2018 4:00 PM BY: HENRY SOUNDY
XREFs: dwg with tp locations
CAD File: N:\Projects\806\FY19\82219014_CENTRAL COAST DEVELOPMENT WYEE\Drawings\Complete\Contam Site Plan\82219014 Geotech Site Plan.dwg

APPENDIX B

LOGS AND EXPLANATORY NOTES

Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
R	Ripper
H	Hydraulic Hammer
X	Existing excavation
N	Natural exposure
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Auger screwing
AD/V	Continuous flight auger: V-bit
AD/T	Continuous spiral flight auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WB	Washbore drilling
RR	Rock roller
Rotary core drilling	
PQ	85mm core (wire line core barrel)
HQ	63.5mm core (wire line core barrel)
NMLC	51.94mm core (conventional core barrel)
NQ	47.6mm core (wire line core barrel)
DT	Diatube (concrete coring)

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
C	Core sample
ES	Environmental soil sample
SPT	Standard Penetration Test sample
U	Thin wall tube ‘undisturbed’ sample
Water sampling	
WS	Environmental water sample

Field testing may be conducted as a means of assessment of the in situ conditions of materials.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket Penetrometer
Dynamic Penetrometers (blows per noted increment)	
DCP	Dynamic Cone Penetrometer
PSP	Perth Sand Penetrometer
MC	Moisture Content
VS	Vane Shear
PBT	Plate Bearing Test
IMP	Borehole Impression Test
PID	Photo Ionization Detector

If encountered, refusal (R), virtual refusal (VR) or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

Rock quality description	
TCR	Total Core Recovery (%) (length of core recovered divided by the length of core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100mm long divided by the length of core run)

Notes on groundwater conditions encountered may include.

Groundwater	
Not Encountered	Excavation is dry in the short term
Not Observed	Water level observation not possible
Seepage	Water seeping into hole
Inflow	Water flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavations may include.

Excavation conditions	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation (minor/major)
Unstable	Collapse of the majority, or one or more face of the excavation

Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, a material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

Soil Classification		Particle Size (mm)
CLAY		< 0.002
SILT		0.002 0.075
SAND	fine	0.075 to 0.21
	medium	0.21 to 0.6
	coarse	0.6 to 2.36
GRAVEL	fine	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES		63 to 200
BOULDERS		> 200

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

Terminology	In coarse grained soils		In fine soils
	% fines	% coarse	% coarse
Trace	≤5	≤15	≤15
With	>5, ≤12	>15, ≤30	>15, ≤30

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

Strength	Symbol	Undrained shear strength
Very Soft	VS	≤12kPa
Soft	S	12kPa to ≤25kPa
Firm	F	25kPa to ≤50kPa
Stiff	St	50kPa to ≤100kPa
Very Stiff	VSt	100kPa to ≤200kPa
Hard	H	>200kPa

Cohesionless soils are classified on the basis of relative density as follows.

Relative Density	Symbol	Density Index
Very Loose	VL	<15%
Loose	L	15% to ≤35%
Medium Dense	MD	35% to ≤65%
Dense	D	65% to ≤85%
Very Dense	VD	>85%

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

Plasticity	Silt LL	Clay LL
Low plasticity	≤ 35%	≤ 35%
Medium plasticity	N/A	> 35% ≤ 50%
High plasticity	> 50%	> 50%

The moisture condition of soil (*w*) is described by appearance and feel and may be described in relation to the Plastic Limit (PL), Liquid Limit (LL) or Optimum Moisture Content (OMC).

Moisture condition and description	
Dry	Cohesive soils: hard, friable, dry of plastic limit. Granular soils: cohesionless and free-running
Moist	Cool feel and darkened colour: Cohesive soils can be moulded. Granular soils tend to cohere
Wet	Cool feel and darkened colour: Cohesive soils usually weakened and free water forms when handling. Granular soils tend to cohere

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer (lenticular shape)
Pocket	Irregular inclusion of different material

The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly or weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin and description	
Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity/water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely weathered material	Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms ‘possibly’ or ‘probably’ may be used

Explanatory Notes: General Rock Description

The methods of description and classification of rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, if a material cannot be remoulded by hand in its field condition or in water, it is described as a rock. In general, descriptions cover: rock type, grain size, structure, colour, degree of weathering, strength, minor components or inclusions, and where applicable, the defect types, shape, roughness and coating/infill.

Rock types are generally described according to the predominant grain or crystal size, and in groups for each rock type as follows.

Rock type	Groups
Sedimentary	Deposited, carbonate (porous or non), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing minerology (iron oxides or hydroxides, silica, calcium carbonate, gypsum)

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

Term and symbol		Definition
Residual Soil	RS	Soil developed on rock with the mass structure and substance of the parent rock no longer evident
Extremely weathered	XW	Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident
Distinctly weathered	DW	The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered).
Slightly weathered	SW	Slightly discoloured; little or no change of strength from fresh rock
Fresh Rock	FR	The rock shows no sign of decomposition or staining

The rock material strength can be defined based on the point load index as follows.

Term and symbol		Point Load Index I_s50 (MPa)
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1.0
High	H	1.0 to 3
Very High	VH	3 to 10
Extremely High	EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

A preliminary assessment of rock strength may be made using the field guide detailed in AS1726, and this is conducted in the absence of point load testing.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

Definition	Defect Spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Terms for describing rock and defects are as follows.

Defect Terms			
Joint	JT	Sheared zone	SZ
Bedding Parting	BP	Seam	SM
Foliation	FL	Vein	VN
Cleavage	CL	Drill Lift	DL
Crushed Seam	CS	Handling Break	HB
Fracture Zone	FZ	Drilling Break	DB

The shape and roughness of defects in the rock mass are described using the following terms.

Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	RF
Undulose	UN	Smooth	S
Irregular	IR	Slickensided	SL
Stepped	ST	Polished	POL
Discontinuous	DIS		

The coating or infill associated with defects in the rock mass are described as follows.

Infill and Coating		
Clean	CN	
Stained	SN	
Carbonaceous	X	
Minerals	MU	Unidentified mineral
	MS	Secondary mineral
	KT	Chlorite
	CA	Calcite
	Fe	Iron Oxide
	Qz	Quartz
Veneer	VNR	Thin or patchy coating
Coating	CT	Infill up to 1mm

Graphic Symbols Index

CLAY	SILT	SAND	GRAVEL
Silty CLAY	Clayey SILT	Clayey SAND	Clayey GRAVEL
Sandy CLAY	Sandy SILT	Silty SAND	Silty GRAVEL
Gravelly CLAY	Gravelly SILT	Gravelly SAND	Sandy GRAVEL
Silty Gravelly CLAY	Clayey Sandy SILT	Clayey Silty SAND	Clayey Silty GRAVEL
Silty Sandy CLAY	Clayey Gravelly SILT	Clayey Gravelly SAND	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Sandy Gravelly SILT	Silty Gravelly SAND	Silty Sandy GRAVEL


COBBLES & BOULDERS


PEAT, highly organic soil


TOPSOIL


FILL


FILL: Asphalt or Bituminous Seal


FILL: Ballast


FILL: Concrete


FILL: Roadbase


Sedimentary rock: fine, mostly clay (CLAYSTONE)


Sedimentary rock: fine, mostly silt (SILTSTONE)


Sedimentary rock: fine, silt and clay (MUDSTONE, SHALE, LAMINITE)


Sedimentary rock: medium (SANDSTONE, GREYWACKE)


Sedimentary rock: fine to coarse, angular (BRECCIA)


Sedimentary rock: coarse, rounded (CONGLOMERATE)


Sedimentary rock: Organic (COAL)


Sedimentary rock: Carbonate (LIMESTONE, DOLOMITE)


Sedimentary rock: Volcanic (TUFF, VOLCANIC BRECCIA, AGGLOMERATE)


Igneous rock: Felsic, fine (RHYOLITE)


Igneous rock: Felsic, coarse (GRANITE)


Igneous rock: Mafic, fine to medium (BASALT, DOLERITE)


Igneous rock: Mafic, coarse (GABBRO)


Metamorphic rock: Foliated, fine to medium (SLATE, PHYLLITE, SHIST)


Metamorphic rock: Foliated, coarse (GNEISS)


Metamorphic rock: Non-foliated (QUARTZITE, HORNFELS, MARBLE)

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP001

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.3m	D 0.10 - 0.20 m		0.5			Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	M		TOPSOIL
				B 0.90 - 1.20 m	VR	1.0		CL	0.25m Sandy CLAY: low plasticity, orange-brown, fine to medium sand	M (>PL)	VSt to H	ALLUVIUM
				D 2.40 - 2.50 m		1.5		SW	2.00m SAND: fine to medium grained, yellow-brown, trace low plasticity silt	M W	MD	
						2.0			2.50m TERMINATED AT 2.50 m Target depth			
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP002

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.4m	D 0.20 - 0.30 m	VR	0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	M		TOPSOIL
									0.30m Silty CLAY: low to medium plasticity, brown-grey mottled orange			ALLUVIUM
				B 0.80 - 1.10 m		1.0		CL-CI		M (>PL)	VSt to H	
						1.5			1.60m Sandy CLAY: low plasticity, pale grey mottled orange, fine to medium grained sand			
						2.0		CL	2.00m Clayey SAND: fine to medium grained, grey mottled orange, low plasticity clay	M (>PL)	H	
								SC		M	D	
						2.5			2.50m TERMINATED AT 2.50 m Target depth	W		

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP003

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered		R	0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	M		TOPSOIL
								SW	0.15m SAND: fine to medium grained, orange-yellow	M	L	ALLUVIUM
						1.0		CL	0.40m Sandy Silty CLAY: low plasticity, brown-grey, fine to medium sand	M (>PL)	St	
						1.5		CI	0.90m Sandy CLAY: medium plasticity, pale grey mottled red, fine to medium grain sand	M (>PL)	St	RESIDUAL SOIL
						2.0			As above, becomes pale grey mottled yellow		H	
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP004

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	M		TOPSOIL
						0.20m		SW	SAND: fine to medium grained, orange-yellow	M	L to MD	ALLUVIUM
				B 0.60 - 0.90 m		0.40m			Silty CLAY: medium plasticity, brown-orange mottled red		St	RESIDUAL SOIL
						0.5						
						1.0			As above, becomes pale grey with lithorelics (siltstone)			
						1.5		Cl		M (>PL)	VSt	
						2.0						
						2.5						
						2.50m			TERMINATED AT 2.50 m Target depth			

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP005

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D		TOPSOIL
									0.30m			
				B 0.40 - 0.70 m D 0.40 - 0.70 m		0.5		CL	Sandy CLAY: low plasticity, brown-orange, fine to medium grain sand	M (>PL)	St	RESIDUAL SOIL
						1.0			1.20m			
				D 1.40 - 1.60 m		1.5		CI	Silty CLAY: medium plasticity, pale grey mottled red As above, becomes with lithorelics (siltstone)	M (>PL)	VSt	
						2.0						
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP006

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	DCP (blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	M		TOPSOIL
						1.0		CL	0.35m Sandy CLAY: low plasticity, brown-orange, fine to medium grain sand, trace rootlets As above, absent rootlets	M (>PL)	St	RESIDUAL SOIL
						1.5		CI	1.10m Silty CLAY: medium plasticity, pale grey mottled red, with lithorelics (siltstone)	M (>PL)	VSt	
						2.0						
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP007

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D to M		TOPSOIL
						1.0		CL	0.30m Sandy CLAY: low plasticity, brown-orange, fine to medium grain sand, trace rootlets	M (>PL)	St	RESIDUAL SOIL
						1.5		CI	0.80m Silty CLAY: medium plasticity, pale grey mottled red, with lithorelics (siltstone)	M (>PL)	VSt	
						2.0			2.50m TERMINATED AT 2.50 m Target depth			
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP008

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m		0			SAND: fine to medium grained, grey-brown, trace low plasticity silt, trace rootlets	D		TOPSOIL
									0.25m			
						0.5			CLAY: medium plasticity, yellow-brown mottled orange		St	RESIDUAL SOIL
						1.0			As above, becomes pale grey mottled red, trace lithorelics (siltstone)		VSt	
					R	1.5		Cl		M (>PL)	H	
						2.0						
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP009

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.2m		R	0.5 1.0 1.5 2.0 2.5			SAND: fine to medium grained, yellow-brown, trace low plasticity silt, trace rootlets 0.25m	D		TOPSOIL
								SW	SAND: fine to medium grained, yellow-brown 0.55m	D	L	ALLUVIUM
								CL-CI	Sandy CLAY: low to medium plasticity, yellow-brown mottled orange, fine to medium grain sand, trace fine to medium sub-angular gravel 0.70m	M (≈PL)	VSt	RESIDUAL SOIL
								CL-CI	Silty CLAY: low to medium plasticity, pale grey mottled red, with lithorelics (siltstone) 2.50m	M (>PL)	VSt H	
									TERMINATED AT 2.50 m Target depth			

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP010

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0			SAND: fine to medium grained, yellow-brown, trace low plasticity silt, trace rootlets	D to M		TOPSOIL
									0.25m			
						0.5		CL-CI	Sandy CLAY: low to medium plasticity, yellow-brown mottled orange, fine to medium grain sand, trace fine to medium sub-angular gravel	M (>PL)	St	RESIDUAL SOIL
									0.65m			
				B 0.65 - 0.95 m		1.0		CL-CI	Silty CLAY: low to medium plasticity, pale grey mottled red, with lithorelics (siltstone)	M (>PL)	St	
											H	
					R	1.5						
									1.50m			
								SW	SAND: medium to coarse grained, pale grey mottled red, with shell fragments	M	VD	EXTREMELY WEATHERED
									1.90m			
						2.0			TERMINATED AT 1.90 m Virtual Refusal			1.90 m: Residual soil transitioning to extremely weathered sandstone
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP011

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.0m			0.5			SAND: fine to medium grained, yellow-brown, trace low plasticity silt, trace rootlets	D		TOPSOIL
						1.0		SC	0.30m Clayey SAND: fine to medium grained, yellow-brown, low to medium plasticity clay, trace fine to medium, sub-angular gravel	M	St	COLLUVIUM
						1.5		CL-CI	1.00m Silty CLAY: low to medium plasticity, pale grey mottled red, with lithorelics (siltstone)	M (>PL)	St to VSt	RESIDUAL SOIL
						2.0						
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP012

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0			SAND: fine to medium grained, yellow-brown, trace low plasticity silt, trace rootlets	M		TOPSOIL
						0.20m		SC	Clayey SAND: fine to medium grained, yellow-brown, low to medium plasticity clay, trace fine to medium, sub-angular gravel	D to M	L	COLLUVIUM
				B 0.50 - 0.80 m	VR	0.50m			Sandy Silty CLAY: low plasticity, red-brown, fine to medium grain sand, trace lithorelics (siltstone)			RESIDUAL SOIL
						1.0		CL	As above, becomes with cobble sized lithorelics (siltstone)	M (>PL)	VSt	
						1.50m			CLAY: medium plasticity, pale grey mottled red, with lithorelics (siltstone)			
						2.0		CI		M (>PL)	VSt	
						2.50m			TERMINATED AT 2.50 m Target depth			
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP013

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0.5			Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	D		TOPSOIL
						1.0		CL	0.30m Sandy Silty CLAY: low plasticity, red-brown, fine to medium grain sand, trace lithorelics (siltstone)	M (>PL)	St VSt	RESIDUAL SOIL
						1.5			1.80m			
						2.0		CI	CLAY: medium plasticity, pale grey mottled red, with lithorelics (siltstone)	M (>PL)	H	
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP014

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0.5		SC	Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets 0.25m Clayey SAND: fine to medium grained, orange-brown, low plasticity clay 0.80m	D M	L to MD	TOPSOIL COLLUVIUM
					R	1.0 1.5		CI	Silty CLAY: medium plasticity, pale grey mottled red 1.50m SILTSTONE, pale grey mottled red, thinly laminated, extremely weathered, extremely low strength 1.60m	M (>PL)	F	RESIDUAL SOIL WEATHERED ROCK
						2.0 2.5			TERMINATED AT 1.60 m Virtual Refusal			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP015

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered		VR	0.5		SC	Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D		TOPSOIL
						1.0			0.30m Clayey SAND: fine to medium grained, yellow-brown, low plasticity clay, with fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
						1.5		CL-CI	1.00m Sandy CLAY: low to medium plasticity, pale grey mottled red, fine to medium grain sand, with lithorelics (siltstone)	M (>PL)	H	RESIDUAL SOIL
						2.0		SW	2.00m SAND: fine to medium grained, pale grey mottled red, with shell fragments	M	VD	EXTREMELY WEATHERED
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP016

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered		VR	0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D		TOPSOIL
						1.0		CL-CI	0.30m Sandy CLAY: low to medium plasticity, orange-brown, fine to medium grain sand, trace lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
						1.5		SW	As above, becomes pale grey mottled orange, with lithorelics (siltstone) 1.40m SAND: medium to coarse grained, pale grey mottled orange, with shell fragments	M	VSt to H VD	EXTREMELY WEATHERED
						2.0			1.80m SANDSTONE, medium to coarse grained, pale grey, extremely weathered, extremely low strength 2.00m TERMINATED AT 2.00 m Virtual Refusal			WEATHERED ROCK
						2.5						

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP017

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 0.6m			0.5			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D		TOPSOIL
						1.0		SW	0.30m SAND: fine to medium grained, pale grey, with clay	M	L	ALLUVIUM
						1.5				W	MD	
								CL-CI	1.40m Sandy CLAY: low to medium plasticity, pale grey mottled red, fine to coarse grain sand, with lithorelics (siltstone)	M (>PL)	VSt	RESIDUAL SOIL
						2.0		SW	1.80m SAND: medium to coarse grained, pale grey mottled orange, with shell fragments	W	D	EXTREMELY WEATHERED
									2.00m SANDSTONE, medium to coarse grained, pale grey, extremely weathered, extremely low strength			WEATHERED ROCK
						2.5			2.10m TERMINATED AT 2.10 m Virtual Refusal			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP018

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m		0			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D		TOPSOIL
						0.30m						
				B 0.50 - 0.80 m		0.5			Silty CLAY: medium plasticity, grey mottled orange red, with sand, trace lithorelics (siltstone)		St	RESIDUAL SOIL
						1.0					St to VSt	
					VR	1.5		CI		M (>PL)		
									As above, becomes pale grey mottled orange, absent sand and lithorelics		H	
						2.0						
						2.5						
									TERMINATED AT 2.50 m Target depth			

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP019

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m		0			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, trace rootlets	D to M		TOPSOIL
									0.30m			
								SW	SAND: fine to medium grained, grey-brown	M	MD	ALLUVIUM
						0.5			0.50m			
									Silty CLAY: medium plasticity, grey mottled orange		St	RESIDUAL SOIL
						1.0						
						1.5		CI		M (>PL)		
									As above, becomes grey mottled red		VSt	
						2.0						
						2.5			2.50m			
									TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP020

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.6m	D 0.10 - 0.20 m		0			Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with clay, trace rootlets	W		TOPSOIL
									0.30m			
				B 0.60 - 1.00 m		0.5		CL	Sandy CLAY: low plasticity, grey mottled brown-orange, fine to medium grain sand, with lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
						1.0					VSt	
						1.5						
									1.60m			
						2.0		CI	Silty CLAY: medium plasticity, pale grey mottled orange	M (>PL)	VSt to H	
						2.5			2.50m			
									TERMINATED AT 2.50 m Target depth			

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP021

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.2m	D 0.10 - 0.20 m		0			Clayey Silty SAND: fine to medium grained, dark brown, low plasticity clay, trace rootlets	M		TOPSOIL
				D 0.50 - 0.60 m		0.30m		SC	Clayey SAND: fine to medium grained, grey, low plasticity clay	M	MD	ALLUVIUM
				PP 2.00 m =350 kPa		0.5						
				PP 2.50 m =300 kPa		0.90m		CL-CI	Sandy CLAY: low to medium plasticity, pale grey mottled orange, fine to coarse grain sand	M (>PL)	VSt	RESIDUAL SOIL
				PP 2.70 m =300 kPa		1.0						
						1.5						
						2.0						
						2.5						
						3.00m			TERMINATED AT 3.00 m Target depth			
						3.0						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP022

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m				Clayey Silty SAND: fine to medium grained, dark brown, low plasticity clay, trace rootlets	W		TOPSOIL
								0.30m			
							SP	Clayey Silty SAND: fine to medium grained, brown, low plasticity clay	W	L	ALLUVIUM
					0.5			0.50m			
				D 0.60 - 0.70 m			SW	SAND: fine to medium grained, pale grey	W	MD	
					1.0			1.00m			
							SC	Clayey SAND: fine to medium grained, pale grey, low plasticity clay	W	MD	
								1.40m			
				PP 1.60 m =400 kPa	1.5		CL	Sandy CLAY: low plasticity, pale grey mottled orange, fine to medium grain sand	M (>PL)	VSt to H	RESIDUAL SOIL
				PP 1.90 m =450 kPa					M (≈PL)	H	
					2.0			2.00m			
								SANDSTONE, medium to coarse grain, pale grey mottled orange, trace shell, extremely weathered, extremely low strength			WEATHERED ROCK
								2.20m			
					2.5			TERMINATED AT 2.20 m Virtual Refusal			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP023

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.20 - 0.30 m	0.5		SC	Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets 0.15m Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel 0.80m	D D to M	 MD	TOPSOIL COLLUVIUM
					1.0		CL-CI	Silty CLAY: low to medium plasticity, brown-orange 1.30m	M (>PL)	St	RESIDUAL SOIL
								SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength 1.40m			WEATHERED ROCK
					1.5			TERMINATED AT 1.40 m Virtual Refusal			
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP024

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered		0			Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	D to M		TOPSOIL
								0.20m			
							SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
					0.5			0.60m			
							CL-CI	Silty CLAY: low to medium plasticity, pale brown mottled orange, with lithorelics (siltstone)	M (>PL)	VSt	RESIDUAL SOIL
				PP 1.00 m =250 kPa	1.0						
				PP 1.30 m =350 kPa				1.40m			
					1.5			SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
								1.60m			
					2.0			TERMINATED AT 1.60 m Virtual Refusal			
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP025

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation: Method	Resistance	Stability	Water	Sampling & Testing: Sample or Field Test	Depth (m)	Graphic Log	Classification	Material Description: SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m				Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	D		TOPSOIL
								0.30m			
					0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
					1.0			1.00m			
								Silty CLAY: low to medium plasticity, pale brown mottled orange, with lithorelics (siltstone)			RESIDUAL SOIL
				PP 1.50 m =400 kPa	1.5		CL-CI		M (>PL)	VSt to H	
								1.70m			
								SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
								1.90m			
					2.0			TERMINATED AT 1.90 m Virtual Refusal			
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP026

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m				Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	M		TOPSOIL
								0.25m			
					0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	D to M	MD	COLLUVIUM
								0.90m			
				PP 1.10 m =320 kPa	1.0		CL-CI	Silty CLAY: low to medium plasticity, pale brown mottled orange, with lithorelics (siltstone)	M (>PL)	VSt	RESIDUAL SOIL
								1.20m			
								SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
								1.40m			
								TERMINATED AT 1.40 m Refusal			
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP027

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m				Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	M		TOPSOIL
								0.20m			
					0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
					1.0			1.10m			
				PP 1.30 m =250 kPa			CL-CI	Silty CLAY: low to medium plasticity, pale brown mottled orange, with lithorelics (siltstone)	M (>PL)	VSt	RESIDUAL SOIL
					1.5						
					2.0			2.00m			
								SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
								2.30m			
					2.5			TERMINATED AT 2.30 m Virtual Refusal			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP028

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 23/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	D 0.10 - 0.20 m	0			Silty SAND: fine to medium grained, brown, low plasticity silt, trace rootlets	D to M		TOPSOIL
								0.20m			
					0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
					1.0						
				PP 1.50 m =250 kPa	1.5			Silty CLAY: low to medium plasticity, pale brown mottled orange, with lithorelics (siltstone)			RESIDUAL SOIL
					2.0		CL-CI		M (>PL)	VSt	
					2.5			2.50m			
								TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP029

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.2m	D 0.10 - 0.20 m		0			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	D to M		TOPSOIL
				D 0.30 - 0.40 m		0.30m		SC	Clayey SAND: fine to medium grained, yellow-brown, low plasticity clay	M	MD	COLLUVIUM
						0.5						
						1.00m			Silty CLAY: low to medium plasticity, grey mottled orange, with lithorelics (siltstone)			RESIDUAL SOIL
						1.0		CL-CI		M (>PL)	St	
						1.5						
						2.0						
						2.20m			SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
						2.30m			TERMINATED AT 2.30 m Virtual Refusal			
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP030

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.9m	D 0.10 - 0.20 m		0.5			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	M		TOPSOIL
									0.30m Clayey SAND: fine to medium grained, yellow-brown, low plasticity clay	D to M	MD	COLLUVIUM
						1.0		SC	0.80m Silty CLAY: low to medium plasticity, grey mottled orange, with lithorelics (siltstone)	M (>PL)	St VSt to H	RESIDUAL SOIL
						1.5		CL-CI	1.90m SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength			WEATHERED ROCK
						2.0			2.10m TERMINATED AT 2.10 m Virtual Refusal			
						2.5						

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP031

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.9m	D 0.10 - 0.20 m		0.5			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets 0.30m	D		TOPSOIL
								SC	Clayey SAND: fine to medium grained, yellow-brown, low plasticity clay 0.70m	D to M	MD	COLLUVIUM
					VR	1.0		CL-CI	Silty CLAY: low to medium plasticity, grey mottled orange, with lithorelics (siltstone) 1.90m	M (>PL)	St VSt to H	RESIDUAL SOIL
						1.5			SILTSTONE, pale grey mottled red, extremely weathered, extremely low strength 2.00m			WEATHERED ROCK
						2.0			TERMINATED AT 2.00 m Virtual Refusal			
						2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP032

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered			0.5			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	D		TOPSOIL
									0.20m Clayey SAND: fine to medium grained, yellow-brown, low plasticity clay	D to M	MD	COLLUVIUM
						1.0		SC	0.70m Silty CLAY: low to medium plasticity, grey mottled orange, with lithorelics (siltstone)	M (>PL)	St VSt to H	RESIDUAL SOIL
						1.5		CL-CI				
						2.0						
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP033

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.7m	B 0.50 - 0.60 m D 0.50 - 0.60 m		0.5		SC	Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets 0.25m Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel 0.90m	D M	 MD	TOPSOIL COLLUVIUM
				B 1.00 - 1.30 m D 1.00 - 1.30 m		1.0 1.5 2.0		CI	Silty CLAY: medium plasticity, grey mottled red, with lithorelics (siltstone) 2.50m	M (>PL)	St VSt to H	RESIDUAL SOIL
						2.5			TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP034

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 2.1m		R	0.5			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	D		TOPSOIL
						1.0		SC	0.30m Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
						1.5			1.00m			
						2.0		CI	Silty CLAY: medium plasticity, grey mottled red, with lithorelics (siltstone)	M (>PL)	VSt to H	RESIDUAL SOIL
						2.5			2.50m TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP035

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing		Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test	(blows per 150 mm) 1 3 6 12		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	inflow encountered at 1.7m	D 0.10 - 0.20 m		0			Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	D		TOPSOIL
									0.25m			
						0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay, trace fine to coarse, sub-angular gravel	M	L to MD	COLLUVIUM
									0.70m			
						1.0		CI	Silty CLAY: medium plasticity, grey mottled red, with lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
						1.5					VSt	
						2.0						
						2.5			2.50m			
									TERMINATED AT 2.50 m Target depth			

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP101

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	M		TOPSOIL
								0.15m			
				ES 0.25 m			SC	Clayey SAND: fine to coarse grained, brown-orange, low to medium plasticity clay, trace fine to coarse, sub-angular gravel	M	MD	COLLUVIUM
				ES 0.50 m	0.5			0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP102

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	M		TOPSOIL
								0.15m			
				ES 0.25 m			SC	Clayey SAND: fine to coarse grained, brown-orange, low to medium plasticity clay, trace fine to coarse, sub-angular gravel	M	L to MD	COLLUVIUM
				ES 0.50 m	0.5			0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP103

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey, low plasticity silt, with rootlets	M		TOPSOIL
								0.20m			
				ES 0.25 m			SC	Clayey SAND: fine to coarse grained, brown-orange, low to medium plasticity clay, trace fine to coarse, sub-angular gravel	M	L to MD	COLLUVIUM
				ES 0.50 m	0.5			0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP104

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with fine to medium, sub angular gravel, trace rootlets	D		TOPSOIL
								0.20m			
				ES 0.25 m			CL-CI	Silty CLAY: low to medium plasticity, orange-brown mottled red	M (>PL)	F to St	RESIDUAL SOIL
				ES 0.50 m	0.5						
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP105

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D		TOPSOIL
				ES 0.25 m			SC	0.20m Clayey SAND: fine to medium grained, grey-brown, low plasticity clay	M	L to MD	COLLUVIUM
				ES 0.50 m	0.5		CI	0.40m Silty CLAY: medium plasticity, orange-brown mottled red, trace lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
								0.60m TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD

EX	Excavator bucket
R	Ripper
HA	Hand auger
PT	Push tube
SON	Sonic drilling
AH	Air hammer
PS	Percussion sampler
AS	Short spiral auger
AD/V	Solid flight auger: V-Bit
AD/T	Solid flight auger: TC-Bit
HFA	Hollow flight auger
WB	Washbore drilling
RR	Rock roller

PENETRATION

VE	Very Easy (No Resistance)
E	Easy
F	Firm
H	Hard
VH	Very Hard (Refusal)

WATER

Water Level on Date shown
water inflow
water outflow

FIELD TESTS

SPT	-	Standard Penetration Test
HP	-	Hand/Pocket Penetrometer
DCP	-	Dynamic Cone Penetrometer
PSP	-	Perth Sand Penetrometer
MC	-	Moisture Content
PBT	-	Plate Bearing Test
IMP	-	Borehole Impression Test
PID	-	Photoionisation Detector
VS	-	Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES

B	-	Bulk disturbed sample
D	-	Disturbed sample
ES	-	Environmental sample
U	-	Thin wall tube 'undisturbed'

MOISTURE

D	-	Dry
M	-	Moist
W	-	Wet
PL	-	Plastic limit
LL	-	Liquid limit
w	-	Moisture content

SOIL CONSISTENCY

VS	-	Very Soft
S	-	Soft
F	-	Firm
St	-	Stiff
VSt	-	Very Stiff
H	-	Hard

RELATIVE DENSITY

VL	-	Very Loose
L	-	Loose
MD	-	Medium Dense
D	-	Dense
VD	-	Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP106

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	M		TOPSOIL
								0.20m			
				ES 0.25 m			SC	Clayey SAND: fine to medium grained, grey-brown, low plasticity clay	M	L to MD	COLLUVIUM
								0.40m			
				ES 0.50 m	0.5		CI	Silty CLAY: medium plasticity, orange-brown mottled red, trace lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP107

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	M		TOPSOIL
								0.20m			
				ES 0.25 m			SC	Clayey SAND: fine to medium grained, grey-brown, low plasticity clay	M	L to MD	COLLUVIUM
				ES 0.50 m	0.5			0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP108

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D to M		TOPSOIL
								0.20m			
				ES 0.25 m			SC	Clayey SAND: fine to medium grained, grey-brown, low plasticity clay	M	L to MD	COLLUVIUM
								0.40m			
				ES 0.50 m	0.5		CI	Silty CLAY: medium plasticity, orange-brown mottled red and grey, trace lithorelics (siltstone)	M (>PL)	St	RESIDUAL SOIL
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP109

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	M		TOPSOIL
				ES 0.25 m				0.25m			
				ES 0.50 m	0.5		SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay	M	L to MD	COLLUVIUM
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP110

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	M		TOPSOIL
								0.20m			
				ES 0.25 m			SC	Clayey SAND: fine to medium grained, brown-orange, low plasticity clay	M to W	L to MD	COLLUVIUM
				ES 0.50 m	0.5			0.60m			
							CI	Silty CLAY: medium plasticity, orange-brown mottled red, trace lithorelics (siltstone)	M (>PL)	F to St	RESIDUAL SOIL
								0.80m			
								TERMINATED AT 0.80 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

Cardno

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP201

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D		TOPSOIL 0.00 m: Eastern side of 'quarried area'
								0.20m			
				ES 0.25 m			CI	Silty CLAY: medium plasticity, orange-brown	M (>PL)	St	RESIDUAL SOIL
				ES 0.50 m	0.5			0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP202

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D		TOPSOIL 0.00 m: Southern side of 'quarried area'
				ES 0.25 m				0.20m			
				ES 0.50 m	0.5		Cl	Silty CLAY: medium plasticity, pale brown mottled orange	M (>PL)	St to VSt	RESIDUAL SOIL
								0.70m			
								SILTSTONE, pale grey, thinly laminated, extremely weathered, extremely low strength			WEATHERED ROCK
								0.80m			
								TERMINATED AT 0.80 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
- EX Excavator bucket
- R Ripper
- HA Hand auger
- PT Push tube
- SON Sonic drilling
- AH Air hammer
- PS Percussion sampler
- AS Short spiral auger
- AD/V Solid flight auger: V-Bit
- AD/T Solid flight auger: TC-Bit
- HFA Hollow flight auger
- WB Washbore drilling
- RR Rock roller

PENETRATION
- VE Very Easy (No Resistance)
- E Easy
- F Firm
- H Hard
- VH Very Hard (Refusal)

WATER
- Water Level on Date shown
- water inflow
- water outflow

FIELD TESTS
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer
- DCP - Dynamic Cone Penetrometer
- PSP - Perth Sand Penetrometer
- MC - Moisture Content
- PBT - Plate Bearing Test
- IMP - Borehole Impression Test
- PID - Photoionisation Detector
- VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
- B - Bulk disturbed sample
- D - Disturbed sample
- ES - Environmental sample
- U - Thin wall tube 'undisturbed'

MOISTURE
- D - Dry
- M - Moist
- W - Wet
- PL - Plastic limit
- LL - Liquid limit
- *w* - Moisture content

SOIL CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP203

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.40 - 0.50 m	0.5			FILL; Silty SAND, fine to medium grain, dark brown, low plasticity silt, with foreign materials	D		FILL 0.00 m: Isolated stockpile within 'quarried area' Foreign materials include; metal, tile and organics
					1.0		CI	1.00m Silty CLAY: medium plasticity, brown-orange 1.10m	M (≈PL)	St	RESIDUAL SOIL
					1.5			TERMINATED AT 1.10 m Target depth			
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP204

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D		TOPSOIL
								0.10m			0.00 m: Northern side of 'quarried area'
				ES 0.25 m			CL-CI	Silty CLAY: low to medium plasticity, pale grey	M (>PL)	St to VSt	RESIDUAL SOIL
								0.30m			
				ES 0.50 m	0.5			SILTSTONE, pale grey, thinly laminated, extremely weathered, extremely low strength			WEATHERED ROCK
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

TEST PIT LOG SHEET

Client: Wyee Land Pty Ltd
Project: Radcliffe, Wyee Developement
Location: Bushells Ridge Road, Bushells Ridge

Hole No: TP205

Job No: 82219014 **Sheet:** 1 of 1

Position: See attached plan **Angle from Horizontal:** -90° **Surface Elevation:**

Machine Type: 5 tonne Excavator **Excavation Method:** 400mm toothed bucket

Excavation Dimensions: **Contractor:** Cardno

Date Excavated: 24/8/18 **Logged By:** HS **Checked By:** GA

Excavation			Water	Sampling & Testing	Depth (m)	Material Description					
Method	Resistance	Stability		Sample or Field Test		Graphic Log	Classification	SOIL TYPE, plasticity or particle characteristic, colour, secondary and minor components ROCK TYPE, grain size and type, colour, fabric & texture, strength, weathering, defects and structure	Moisture Condition	Consistency Relative Density	STRUCTURE & Other Observations
EX		Stable	Not Encountered	ES 0.10 m				Silty SAND: fine to medium grained, grey-brown, low plasticity silt, with rootlets	D		TOPSOIL
								0.10m			0.00 m: Approximate centre of 'quarried area'
				ES 0.25 m			CL-CI	Silty CLAY: low to medium plasticity, pale grey	M (>PL)	St to VSt	RESIDUAL SOIL
								0.30m			
				ES 0.50 m	0.5			SILTSTONE, pale grey, thinly laminated, extremely weathered, extremely low strength			WEATHERED ROCK
								0.60m			
								TERMINATED AT 0.60 m Target depth			
					1.0						
					1.5						
					2.0						
					2.5						

METHOD
EX Excavator bucket
R Ripper
HA Hand auger
PT Push tube
SON Sonic drilling
AH Air hammer
PS Percussion sampler
AS Short spiral auger
AD/V Solid flight auger: V-Bit
AD/T Solid flight auger: TC-Bit
HFA Hollow flight auger
WB Washbore drilling
RR Rock roller

PENETRATION
VE Very Easy (No Resistance)
E Easy
F Firm
H Hard
VH Very Hard (Refusal)

WATER
Water Level on Date shown
water inflow
water outflow

FIELD TESTS
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer
DCP - Dynamic Cone Penetrometer
PSP - Perth Sand Penetrometer
MC - Moisture Content
PBT - Plate Bearing Test
IMP - Borehole Impression Test
PID - Photoionisation Detector
VS - Vane Shear; P=Peak, R=Resdual (uncorrected kPa)

SAMPLES
B - Bulk disturbed sample
D - Disturbed sample
ES - Environmental sample
U - Thin wall tube 'undisturbed'

MOISTURE
D - Dry
M - Moist
W - Wet
PL - Plastic limit
LL - Liquid limit
w - Moisture content

SOIL CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

CARDNO (NSW/ACT) PTY LTD

APPENDIX

C

ANALYTICAL RESULTS

CHAIN OF CUSTODY RECORD

Cardno
Shaping the Future

LAB Name	SGS
Address	16/33 Maddox St Alexandria NSW 2015

Client	Cardno (NSW/ACT) Pty Ltd PO Box 74 Broadmeadow NSW 2292

Contact Numbers	
Phone	0249 654555
Fax	0249 654666

Contact	Daniel McCallum
Sampled by	Daniel McCallum
Project Ref:	82219014

E-mail	daniel.mccallum@cardno.com.au	dimce.stojanvoski@cardno.com.au

(invoice to geotech@cardno.com.au)

Date Results Required	Standard TAT

			Matrix		Containers/Preservation									Analysis Required						
Laboratory LIMS ID	Client Sample ID	Date Sampled	Soil	Water	Soil Jar (G) Nat. Orange	0.5-1.0 litre (G) Nat. Yellow	0.1-1.0 litre (P) Nat. Green	50mL VOA Vial (G) H_2SO_4 Maroon	0.1-1.0 litre (P) H_2SO_4 Maroon	0.2-1.0 litre (G) H_2SO_4 Maroon	0.1-0.2 (P) Filtered?? Y=Yes, N=No (HNO_3) Red	0.2l (P) NaOH Blue	Other	CL17	pH(CaCT2 Extract), CEC, Clay Content (%)	Asbestos ID	TRH	BTEX		
1	TP101 0.1	24/08/2018	☒											☒		☒				
2	TP102 0.1	24/08/2018	☒											☒						
3	TP103 0.1	24/08/2018	☒											☒	☒					
4	TB104 0.1	24/08/2018	☒											☒						
5	TP105 0.1	24/08/2018	☒											☒						
6	TP106 0.1	24/08/2018	☒											☒						
7	TP107 0.25	24/08/2018	☒											☒						
8	TP108 0.1	24/08/2018	☒											☒						
9	TP109 0.1	24/08/2018	☒											☒		☒				
10	TP110 0.1	24/08/2018	☒											☒						
11	DUP2	24/08/2018	☒											☒						
12	RINS24.08.2018	24/08/2018	☒														☒	☒		

SGS EHS Alexandria Laboratory

SE183216 COC
Received: 29 – Aug – 2018

Released by: Daniel McCallum Signature [signature] Date/Time 28/8/2018
Received by: Nessa Signature [signature] Date/Time 29/8/18 10:30

Custody Seals Intact? / Samples Received Chilled?

RE: SE183216 - 82219014

Dan McCallum <daniel.mccallum@cardno.com.au>

Tue 4/09/2018 9:06 AM

To: AU.SampleReceipt.Sydney (Sydney) <AU.SampleReceipt.Sydney@sgs.com>; Dimce Stojanovski <dimce.stojanovski@cardno.com.au>;

Hi Emily,

Sample TP107_0.1 wasn't meant to be in that esky, sorry about that. Could we please just have it on hold?

Regards,

Dan McCallum
GRADUATE ENVIRONMENTAL SCIENTIST
CARDNO

Cardno

Phone Fax +61 2 4940 5545 Direct +61 2 4940 5545
Address Unit 1, 10 Denney Street, Broadmeadow, New South Wales 2292 Australia

Email daniel.mccallum@cardno.com.au Web www.cardno.com.au
CONNECT WITH CARDNO

From: AU.SampleReceipt.Sydney (Sydney) [mailto:AU.SampleReceipt.Sydney@sgs.com]
Sent: Monday, 3 September 2018 7:18 PM
To: Dan McCallum <daniel.mccallum@cardno.com.au>; Dimce Stojanovski <dimce.stojanovski@cardno.com.au>
Subject: SE183216 - 82219014

Dear Daniel/Dimce,

Extra sample TP107_0.1 received.
Do you want it analysed?
Please advise as soon as possible.
Thank You.

Regards,

Emily Yin

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Daniel McCallum	Manager	Jon Dicker
Client	CARDNO (NSW/ACT) PTY LTD	Laboratory	SGS Cairns Environmental
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292	Address	Unit 2, 58 Comport St Portsmith QLD 4870
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Email	daniel.mccallum@cardno.com.au	Email	AU.Environmental.Cairns@sgs.com
Project	**82219014**	SGS Reference	**CE135439 R0**
Order Number	**SE183216**	Date Received	31 Aug 2018
Samples	1	Date Reported	05 Sep 2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146).

SIGNATORIES

Anthony Nilsson
Operations Manager

Jon Dicker
Manager Northern QLD

Parameter	Units	LOR	Sample Number: CE135439.001 Sample Matrix: Soil Sample Date: 24 Aug 2018 Sample Name: T103 0.1
Moisture Content Method: AN002 Tested: 31/8/2018			
% Moisture	%w/w	1	**6.2**
Particle sizing of soils by sieving Method: AN005 Tested: 5/9/2018			
Passing 75µm	%w/w	1	**19**
Retained 75µm	%w/w	1	**81**
Particle sizing of soils <75µm by hydrometer Method: AN005 Tested: 5/9/2018			
Clay (<0.002mm)	%w/w	0.1	**15**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

No QC samples were reported for this job.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN005	The particle size distribution of a soil is determined by wet sieving, using a maximum of 900 mL of deionised water to sieve all fractions down to 75 µm. Referenced to AS1289.3.6.1 and AS1141.11.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
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Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183216 R0**
Date Received	29/8/2018
Date Reported	13/9/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Clay % subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146,

A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemist

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

VOC's in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1
Lindane	mg/kg	0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1
Aldrin	mg/kg	0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2
Endrin	mg/kg	0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1
Isodrin	mg/kg	0.1	<0.1
Mirex	mg/kg	0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1

OP Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Dichlorvos	mg/kg	0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2
Malathion	mg/kg	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2
Methidathion	mg/kg	0.5	<0.5
Ethion	mg/kg	0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7

PCBs in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Arochlor 1016	mg/kg	0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1

pH in soil (1:5) [AN101] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
pH (CaCl2)*	pH Units	0.1	**4.1**

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
Exchangeable Sodium, Na	mg/kg	2	**8**
Exchangeable Sodium, Na	meq/100g	0.01	**0.04**
Exchangeable Sodium Percentage*	%	0.1	**5.7**
Exchangeable Potassium, K	mg/kg	2	**23**
Exchangeable Potassium, K	meq/100g	0.01	**0.06**
Exchangeable Potassium Percentage*	%	0.1	**9.5**
Exchangeable Calcium, Ca	mg/kg	2	**68**
Exchangeable Calcium, Ca	meq/100g	0.01	**0.34**
Exchangeable Calcium Percentage*	%	0.1	**54.0**
Exchangeable Magnesium, Mg	mg/kg	2	**24**
Exchangeable Magnesium, Mg	meq/100g	0.02	**0.19**
Exchangeable Magnesium Percentage*	%	0.1	**30.7**
Cation Exchange Capacity	meq/100g	0.02	**0.63**

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Arsenic, As	mg/kg	1	<1	1	2	2	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	2.7	1.3	3.0	3.5	1.5
Copper, Cu	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lead, Pb	mg/kg	1	2	2	3	2	2
Nickel, Ni	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc, Zn	mg/kg	2	<2.0	2.4	3.0	2.5	<2.0

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Arsenic, As	mg/kg	1	1	<1	<1	1	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	0.9	2.3	0.5	1.4	1.0
Copper, Cu	mg/kg	0.5	<0.5	<0.5	0.8	<0.5	0.5
Lead, Pb	mg/kg	1	1	<1	<1	1	2
Nickel, Ni	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc, Zn	mg/kg	2	4.3	<2.0	2.6	2.5	3.2

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Arsenic, As	mg/kg	1	1
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	2.8
Copper, Cu	mg/kg	0.5	<0.5
Lead, Pb	mg/kg	1	2
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	<2.0

Mercury in Soil [AN312] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
% Moisture	%w/w	0.5	5.8	7.7	6.5	6.6	9.6

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
% Moisture	%w/w	0.5	8.0	13	18	9.2	13

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
% Moisture	%w/w	0.5	8.0

Fibre Identification in soil [AN602] Tested: 4/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP109 0.1 SOIL - 24/8/2018 SE183216.009
Asbestos Detected	No unit	-	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01

VOCs in Water [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 31/8/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60

Sample Subcontracted [] Tested: 13/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
Sample Subcontracted*	No unit	-	Subcontracted
SGS Cairns*	No unit	-	Subcontracted

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.

AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE183216 R0

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	12

LABORATORY DETAILS

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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183216 R0**
Date Received	29 Aug 2018
Date Reported	13 Sep 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	pH in soil (1:5)	1 item
	VOCs in Water	1 item
	Volatile Petroleum Hydrocarbons in Water	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	12 Soil
Date documentation received	29/8/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.1°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE183216 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP103 0.1	SE183216.003	LB155649	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018

Fibre Identification in soil

Method: ME-(AU)-[ENV]AN602

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155838	24 Aug 2018	29 Aug 2018	24 Aug 2019	04 Sep 2018	24 Aug 2019	05 Sep 2018
TP109 0.1	SE183216.009	LB155838	24 Aug 2018	29 Aug 2018	24 Aug 2019	04 Sep 2018	24 Aug 2019	05 Sep 2018

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
DUP2	SE183216.011	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
DUP2	SE183216.011	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

HOLDING TIME SUMMARY

SE183216 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

OP Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP103 0.1	SE183216.003	LB155661	24 Aug 2018	29 Aug 2018	31 Aug 2018	03 Sep 2018†	04 Sep 2018	03 Sep 2018

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP102 0.1	SE183216.002	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP103 0.1	SE183216.003	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP104 0.1	SE183216.004	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP105 0.1	SE183216.005	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP106 0.1	SE183216.006	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP107 0.25	SE183216.007	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP108 0.1	SE183216.008	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP109 0.1	SE183216.009	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP110 0.1	SE183216.010	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
DUP2	SE183216.011	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

HOLDING TIME SUMMARY

SE183216 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155528	24 Aug 2018	29 Aug 2018	31 Aug 2018	31 Aug 2018	10 Oct 2018	03 Sep 2018

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP102 0.1	SE183216.002	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP103 0.1	SE183216.003	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP104 0.1	SE183216.004	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP105 0.1	SE183216.005	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP106 0.1	SE183216.006	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155745	24 Aug 2018	29 Aug 2018	31 Aug 2018	03 Sep 2018†	13 Oct 2018	05 Sep 2018

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP102 0.1	SE183216.002	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP103 0.1	SE183216.003	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP104 0.1	SE183216.004	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP105 0.1	SE183216.005	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP106 0.1	SE183216.006	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155745	24 Aug 2018	29 Aug 2018	31 Aug 2018	03 Sep 2018†	13 Oct 2018	05 Sep 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	105
	TP102 0.1	SE183216.002	%	60 - 130%	117
	TP103 0.1	SE183216.003	%	60 - 130%	121
	TP104 0.1	SE183216.004	%	60 - 130%	119
	TP105 0.1	SE183216.005	%	60 - 130%	123
	TP106 0.1	SE183216.006	%	60 - 130%	117
	TP107 0.25	SE183216.007	%	60 - 130%	120
	TP108 0.1	SE183216.008	%	60 - 130%	122
	TP109 0.1	SE183216.009	%	60 - 130%	113
	TP110 0.1	SE183216.010	%	60 - 130%	121
	DUP2	SE183216.011	%	60 - 130%	123

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	88
	TP102 0.1	SE183216.002	%	60 - 130%	86
	TP103 0.1	SE183216.003	%	60 - 130%	82
	TP104 0.1	SE183216.004	%	60 - 130%	86
	TP105 0.1	SE183216.005	%	60 - 130%	90
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	88
	TP108 0.1	SE183216.008	%	60 - 130%	88
	TP109 0.1	SE183216.009	%	60 - 130%	90
	TP110 0.1	SE183216.010	%	60 - 130%	86
	DUP2	SE183216.011	%	60 - 130%	92
d14-p-terphenyl (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	102
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	98
	TP104 0.1	SE183216.004	%	60 - 130%	94
	TP105 0.1	SE183216.005	%	60 - 130%	96
	TP106 0.1	SE183216.006	%	60 - 130%	100
	TP107 0.25	SE183216.007	%	60 - 130%	98
	TP108 0.1	SE183216.008	%	60 - 130%	96
	TP109 0.1	SE183216.009	%	60 - 130%	102
	TP110 0.1	SE183216.010	%	60 - 130%	100
	DUP2	SE183216.011	%	60 - 130%	96

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	88
	TP102 0.1	SE183216.002	%	70 - 130%	86
	TP103 0.1	SE183216.003	%	70 - 130%	82
	TP104 0.1	SE183216.004	%	70 - 130%	86
	TP105 0.1	SE183216.005	%	70 - 130%	90
	TP106 0.1	SE183216.006	%	70 - 130%	86
	TP107 0.25	SE183216.007	%	70 - 130%	88
	TP108 0.1	SE183216.008	%	70 - 130%	88
	TP109 0.1	SE183216.009	%	70 - 130%	90
	TP110 0.1	SE183216.010	%	70 - 130%	86
	DUP2	SE183216.011	%	70 - 130%	92
d14-p-terphenyl (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	102
	TP102 0.1	SE183216.002	%	70 - 130%	90
	TP103 0.1	SE183216.003	%	70 - 130%	98
	TP104 0.1	SE183216.004	%	70 - 130%	94
	TP105 0.1	SE183216.005	%	70 - 130%	96
	TP106 0.1	SE183216.006	%	70 - 130%	100
	TP107 0.25	SE183216.007	%	70 - 130%	98
	TP108 0.1	SE183216.008	%	70 - 130%	96
	TP109 0.1	SE183216.009	%	70 - 130%	102
	TP110 0.1	SE183216.010	%	70 - 130%	100
	DUP2	SE183216.011	%	70 - 130%	96
d5-nitrobenzene (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	80

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d5-nitrobenzene (Surrogate)	TP102 0.1	SE183216.002	%	70 - 130%	82
	TP103 0.1	SE183216.003	%	70 - 130%	92
	TP104 0.1	SE183216.004	%	70 - 130%	84
	TP105 0.1	SE183216.005	%	70 - 130%	86
	TP106 0.1	SE183216.006	%	70 - 130%	80
	TP107 0.25	SE183216.007	%	70 - 130%	84
	TP108 0.1	SE183216.008	%	70 - 130%	84
	TP109 0.1	SE183216.009	%	70 - 130%	82
	TP110 0.1	SE183216.010	%	70 - 130%	82
	DUP2	SE183216.011	%	70 - 130%	82

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	105
	TP102 0.1	SE183216.002	%	60 - 130%	117
	TP103 0.1	SE183216.003	%	60 - 130%	121
	TP104 0.1	SE183216.004	%	60 - 130%	119
	TP105 0.1	SE183216.005	%	60 - 130%	123
	TP106 0.1	SE183216.006	%	60 - 130%	117
	TP107 0.25	SE183216.007	%	60 - 130%	120
	TP108 0.1	SE183216.008	%	60 - 130%	122
	TP109 0.1	SE183216.009	%	60 - 130%	113
	TP110 0.1	SE183216.010	%	60 - 130%	121
	DUP2	SE183216.011	%	60 - 130%	123

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	77
	TP103 0.1	SE183216.003	%	60 - 130%	75
	TP104 0.1	SE183216.004	%	60 - 130%	74
	TP105 0.1	SE183216.005	%	60 - 130%	78
	TP106 0.1	SE183216.006	%	60 - 130%	75
	TP107 0.25	SE183216.007	%	60 - 130%	75
	TP108 0.1	SE183216.008	%	60 - 130%	74
	TP109 0.1	SE183216.009	%	60 - 130%	82
	TP110 0.1	SE183216.010	%	60 - 130%	75
	DUP2	SE183216.011	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	98
	TP102 0.1	SE183216.002	%	60 - 130%	99
	TP103 0.1	SE183216.003	%	60 - 130%	79
	TP104 0.1	SE183216.004	%	60 - 130%	95
	TP105 0.1	SE183216.005	%	60 - 130%	86
	TP106 0.1	SE183216.006	%	60 - 130%	93
	TP107 0.25	SE183216.007	%	60 - 130%	92
	TP108 0.1	SE183216.008	%	60 - 130%	93
	TP109 0.1	SE183216.009	%	60 - 130%	89
	TP110 0.1	SE183216.010	%	60 - 130%	82
	DUP2	SE183216.011	%	60 - 130%	85
d8-toluene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	70
	TP104 0.1	SE183216.004	%	60 - 130%	79
	TP105 0.1	SE183216.005	%	60 - 130%	76
	TP106 0.1	SE183216.006	%	60 - 130%	84
	TP107 0.25	SE183216.007	%	60 - 130%	82
	TP108 0.1	SE183216.008	%	60 - 130%	76
	TP109 0.1	SE183216.009	%	60 - 130%	80
	TP110 0.1	SE183216.010	%	60 - 130%	73
	DUP2	SE183216.011	%	60 - 130%	76
Dibromofluoromethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	85
	TP102 0.1	SE183216.002	%	60 - 130%	93

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	TP103 0.1	SE183216.003	%	60 - 130%	74
	TP104 0.1	SE183216.004	%	60 - 130%	81
	TP105 0.1	SE183216.005	%	60 - 130%	77
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	84
	TP108 0.1	SE183216.008	%	60 - 130%	79
	TP109 0.1	SE183216.009	%	60 - 130%	84
	TP110 0.1	SE183216.010	%	60 - 130%	77
	DUP2	SE183216.011	%	60 - 130%	79

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	114
d8-toluene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101
Dibromofluoromethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	77
	TP103 0.1	SE183216.003	%	60 - 130%	75
	TP104 0.1	SE183216.004	%	60 - 130%	74
	TP105 0.1	SE183216.005	%	60 - 130%	78
	TP106 0.1	SE183216.006	%	60 - 130%	75
	TP107 0.25	SE183216.007	%	60 - 130%	75
	TP108 0.1	SE183216.008	%	60 - 130%	74
	TP109 0.1	SE183216.009	%	60 - 130%	82
	TP110 0.1	SE183216.010	%	60 - 130%	75
	DUP2	SE183216.011	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	98
	TP102 0.1	SE183216.002	%	60 - 130%	99
	TP103 0.1	SE183216.003	%	60 - 130%	79
	TP104 0.1	SE183216.004	%	60 - 130%	95
	TP105 0.1	SE183216.005	%	60 - 130%	86
	TP106 0.1	SE183216.006	%	60 - 130%	93
	TP107 0.25	SE183216.007	%	60 - 130%	92
	TP108 0.1	SE183216.008	%	60 - 130%	93
	TP109 0.1	SE183216.009	%	60 - 130%	89
	TP110 0.1	SE183216.010	%	60 - 130%	82
	DUP2	SE183216.011	%	60 - 130%	85
d8-toluene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	70
	TP104 0.1	SE183216.004	%	60 - 130%	79
	TP105 0.1	SE183216.005	%	60 - 130%	76
	TP106 0.1	SE183216.006	%	60 - 130%	84
	TP107 0.25	SE183216.007	%	60 - 130%	82
	TP108 0.1	SE183216.008	%	60 - 130%	76
	TP109 0.1	SE183216.009	%	60 - 130%	80
	TP110 0.1	SE183216.010	%	60 - 130%	73
	DUP2	SE183216.011	%	60 - 130%	76
Dibromofluoromethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	85
	TP102 0.1	SE183216.002	%	60 - 130%	93
	TP103 0.1	SE183216.003	%	60 - 130%	74
	TP104 0.1	SE183216.004	%	60 - 130%	81
	TP105 0.1	SE183216.005	%	60 - 130%	77
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	84
	TP108 0.1	SE183216.008	%	60 - 130%	79
	TP109 0.1	SE183216.009	%	60 - 130%	84
	TP110 0.1	SE183216.010	%	60 - 130%	77

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	DUP2	SE183216.011	%	60 - 130%	79

Volatile Petroleum Hydrocarbons in Water — **Method: ME-(AU)-[ENV]AN433**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	60 - 130%	114
d8-toluene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101
Dibromofluoromethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result
LB155649.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB155630.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
		Alpha BHC	mg/kg	0.1	<0.1
		Lindane	mg/kg	0.1	<0.1
		Heptachlor	mg/kg	0.1	<0.1
		Aldrin	mg/kg	0.1	<0.1
		Beta BHC	mg/kg	0.1	<0.1
		Delta BHC	mg/kg	0.1	<0.1
		Heptachlor epoxide	mg/kg	0.1	<0.1
		Alpha Endosulfan	mg/kg	0.2	<0.2
		Gamma Chlordane	mg/kg	0.1	<0.1
		Alpha Chlordane	mg/kg	0.1	<0.1
		p,p'-DDE	mg/kg	0.1	<0.1
		Dieldrin	mg/kg	0.2	<0.2
		Endrin	mg/kg	0.2	<0.2
		Beta Endosulfan	mg/kg	0.2	<0.2
		p,p'-DDD	mg/kg	0.1	<0.1
		p,p'-DDT	mg/kg	0.1	<0.1
		Endosulfan sulphate	mg/kg	0.1	<0.1
		Endrin Aldehyde	mg/kg	0.1	<0.1
		Methoxychlor	mg/kg	0.1	<0.1
		Endrin Ketone	mg/kg	0.1	<0.1
		Isodrin	mg/kg	0.1	<0.1
		Mirex	mg/kg	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	95

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Dichlorvos	mg/kg	0.5	<0.5
		Dimethoate	mg/kg	0.5	<0.5
		Diazinon (Dimpylate)	mg/kg	0.5	<0.5
		Fenitrothion	mg/kg	0.2	<0.2
		Malathion	mg/kg	0.2	<0.2
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
		Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
		Bromophos Ethyl	mg/kg	0.2	<0.2
		Methidathion	mg/kg	0.5	<0.5
		Ethion	mg/kg	0.2	<0.2
		Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	94
		d14-p-terphenyl (Surrogate)	%	-	98

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB155627.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	84
		2-fluorobiphenyl (Surrogate)	%	-	94
		d14-p-terphenyl (Surrogate)	%	-	98

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	95

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB155629.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB155627.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB155528.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	74
		d4-1,2-dichloroethane (Surrogate)	%	-	72

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001	Surrogates	d8-toluene (Surrogate)	%	-	106
		Bromofluorobenzene (Surrogate)	%	-	74
	Totals	Total BTEX	mg/kg	0.6	<0.6

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155745.001	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5
	Hydrocarbons	Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	96
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	90

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	74
		d4-1,2-dichloroethane (Surrogate)	%	-	72
		d8-toluene (Surrogate)	%	-	106

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155745.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	96
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	90

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155630.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE183216.011	LB155630.023	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155628.011	% Moisture	%w/w	0.5	6.5	6.2	46	5
SE183216.011	LB155628.020	% Moisture	%w/w	0.5	8.0	8.6	42	7

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.001	LB155627.028		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	0	200	0
			Alpha BHC	mg/kg	0.1	<0.1	0	200	0
			Lindane	mg/kg	0.1	<0.1	0	200	0
			Heptachlor	mg/kg	0.1	<0.1	0	200	0
			Aldrin	mg/kg	0.1	<0.1	0	200	0
			Beta BHC	mg/kg	0.1	<0.1	0	200	0
			Delta BHC	mg/kg	0.1	<0.1	0	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	0	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	0	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	0	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	0	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	0	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	0	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	0	200	0
			Dieldrin	mg/kg	0.2	<0.2	0	200	0
			Endrin	mg/kg	0.2	<0.2	0	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	0	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	0	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	0	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	0	200	0
			p,p'-DDT	mg/kg	0.1	<0.1	0	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	0	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	0	200	0
			Methoxychlor	mg/kg	0.1	<0.1	0	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	0	200	0
			Isodrin	mg/kg	0.1	<0.1	0	200	0
			Mirex	mg/kg	0.1	<0.1	0	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.16	0.187	30	17
SE183216.011	LB155627.023		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
			Endrin	mg/kg	0.2	<0.2	<0.2	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.011	LB155627.023		p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.19	0.19	30	3

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026		Dichlorvos	mg/kg	0.5	<0.5	0	200	0
			Dimethoate	mg/kg	0.5	<0.5	0	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	0	200	0
			Fenitrothion	mg/kg	0.2	<0.2	0	200	0
			Malathion	mg/kg	0.2	<0.2	0	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	0	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	0	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	0	200	0
			Methidathion	mg/kg	0.5	<0.5	0	200	0
			Ethion	mg/kg	0.2	<0.2	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	0	200	0
			Total OP Pesticides*	mg/kg	1.7	<1.7	0	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.43	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.45	30	0
SE183216.011	LB155627.023		Dichlorvos	mg/kg	0.5	<0.5	<0.5	200	0
			Dimethoate	mg/kg	0.5	<0.5	<0.5	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	200	0
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	200	0
			Malathion	mg/kg	0.2	<0.2	<0.2	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	200	0
			Methidathion	mg/kg	0.5	<0.5	<0.5	200	0
			Ethion	mg/kg	0.2	<0.2	<0.2	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	200	0
			Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026	Naphthalene	mg/kg	0.1	<0.1	0	200	0
		2-methylnaphthalene	mg/kg	0.1	<0.1	0	200	0
		1-methylnaphthalene	mg/kg	0.1	<0.1	0	200	0
		Acenaphthylene	mg/kg	0.1	<0.1	0	200	0
		Acenaphthene	mg/kg	0.1	<0.1	0	200	0
		Fluorene	mg/kg	0.1	<0.1	0	200	0
		Phenanthrene	mg/kg	0.1	<0.1	0.02	200	0
		Anthracene	mg/kg	0.1	<0.1	0.02	200	0
		Fluoranthene	mg/kg	0.1	<0.1	0	200	0
		Pyrene	mg/kg	0.1	<0.1	0	200	0
		Benzo(a)anthracene	mg/kg	0.1	<0.1	0	200	0
		Chrysene	mg/kg	0.1	<0.1	0	200	0
		Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0	200	0
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0	200	0
		Benzo(a)pyrene	mg/kg	0.1	<0.1	0.01	200	0
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0	200	0
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	0	200	0
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	0	200	0
		Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026		Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	0.121	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	0	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	2
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.43	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.45	30	0
SE183216.011	LB155627.023		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	<0.3	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.001	LB155627.025		Arochlor 1016	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	0	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	0	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0.187	30	17
SE183216.011	LB155627.023		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	3

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate		Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES (continued)

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155629.014		Arsenic, As	mg/kg	1	2	3	73	41
			Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
			Chromium, Cr	mg/kg	0.3	3.0	3.3	46	7
			Copper, Cu	mg/kg	0.5	<0.5	<0.5	200	0
			Nickel, Ni	mg/kg	0.5	<0.5	<0.5	200	0
			Lead, Pb	mg/kg	1	3	3	64	4
			Zinc, Zn	mg/kg	2	3.0	3.0	97	3
SE183216.011	LB155629.023		Arsenic, As	mg/kg	1	1	<1	134	32
			Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
			Chromium, Cr	mg/kg	0.3	2.8	2.3	49	19
			Copper, Cu	mg/kg	0.5	<0.5	<0.5	200	0
			Nickel, Ni	mg/kg	0.5	<0.5	<0.5	200	0
			Lead, Pb	mg/kg	1	2	<1	129	63
			Zinc, Zn	mg/kg	2	<2.0	<2.0	200	0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.025		TRH C10-C14	mg/kg	20	<20	0	200	0
			TRH C15-C28	mg/kg	45	<45	0	200	0
			TRH C29-C36	mg/kg	45	<45	0	200	0
			TRH C37-C40	mg/kg	100	<100	0	200	0
			TRH C10-C36 Total	mg/kg	110	<110	0	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	0	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0
SE183216.011	LB155627.023		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155626.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	50	15
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	4.6	50	15
			d8-toluene (Surrogate)	mg/kg	-	3.5	4.1	50	16
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.5	50	7
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE183216.011	LB155626.023	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	4.2	50	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.5	50	6
			d8-toluene (Surrogate)	mg/kg	-	3.8	4.1	50	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	3.6	50	11

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.011	LB155626.023	Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.012	LB155745.022	Monocyclic	Benzene	µg/L	0.5	<0.5	0.04	200	0
		Aromatic	Toluene	µg/L	0.5	<0.5	0.04	200	0
			Ethylbenzene	µg/L	0.5	<0.5	0.01	200	0
			m/p-xylene	µg/L	1	<1	0.02	200	0
			o-xylene	µg/L	0.5	<0.5	0.01	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	0.01	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.88	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.52	30	4
			d8-toluene (Surrogate)	µg/L	-	5.1	4.84	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.3	4.37	30	2

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155626.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	30	15
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	4.6	30	15
			d8-toluene (Surrogate)	mg/kg	-	3.5	4.1	30	16
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.5	30	7
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE183216.011	LB155626.023		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	4.2	30	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.5	30	6
			d8-toluene (Surrogate)	mg/kg	-	3.8	4.1	30	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	3.6	30	11
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.012	LB155745.022		TRH C6-C10	µg/L	50	<50	0	200	0
			TRH C6-C9	µg/L	40	<40	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.88	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.52	30	4
			d8-toluene (Surrogate)	µg/L	-	5.1	4.84	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.3	4.37	30	2
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	0.04	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	-0.12	200	0
SE183244.010	LB155745.023		TRH C6-C10	µg/L	50	0	0	200	0
			TRH C6-C9	µg/L	40	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.8	5.31	30	10
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.45	6.05	30	10
			d8-toluene (Surrogate)	µg/L	-	4.8	5.22	30	8
			Bromofluorobenzene (Surrogate)	µg/L	-	4.21	4.16	30	1
		VPH F Bands	Benzene (F0)	µg/L	0.5	0.05	0.04	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	-0.16	-0.17	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155649.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	102
	Exchangeable Potassium, K	mg/kg	2	NA	238.12	80 - 120	97
	Exchangeable Calcium, Ca	mg/kg	2	NA	692	80 - 120	91
	Exchangeable Magnesium, Mg	mg/kg	2	NA	134.2	80 - 120	100

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155630.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	96

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	109
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	106
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	104
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	105
		Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	99
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	89
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	40 - 130	96

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Dichlorvos	mg/kg	0.5	2.0	2	60 - 140	100
		Diazinon (Dimpylate)	mg/kg	0.5	2.3	2	60 - 140	117
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.2	2	60 - 140	108
		Ethion	mg/kg	0.2	1.8	2	60 - 140	89
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Naphthalene	mg/kg	0.1	4.2	4	60 - 140	106
		Acenaphthylene	mg/kg	0.1	4.2	4	60 - 140	105
		Acenaphthene	mg/kg	0.1	3.9	4	60 - 140	97
		Phenanthrene	mg/kg	0.1	4.2	4	60 - 140	104
		Anthracene	mg/kg	0.1	4.1	4	60 - 140	103
		Fluoranthene	mg/kg	0.1	4.4	4	60 - 140	109
		Pyrene	mg/kg	0.1	4.3	4	60 - 140	108
		Benzo(a)pyrene	mg/kg	0.1	4.7	4	60 - 140	118
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	78
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002	Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	114

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155629.002	Arsenic, As	mg/kg	1	340	336.32	79 - 120	100
	Cadmium, Cd	mg/kg	0.3	430	416.6	69 - 131	103
	Chromium, Cr	mg/kg	0.3	38	35.2	80 - 120	109
	Copper, Cu	mg/kg	0.5	330	370.46	80 - 120	88
	Nickel, Ni	mg/kg	0.5	180	210.88	79 - 120	87
	Lead, Pb	mg/kg	1	92	107.87	79 - 120	85
	Zinc, Zn	mg/kg	2	290	301.27	80 - 121	96

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		TRH C10-C14	mg/kg	20	43	40	60 - 140	108
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	93
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	80
	TRH F Bands	TRH >C10-C16	mg/kg	25	39	40	60 - 140	98
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	83
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	95

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155528.002		TRH C10-C14	µg/L	50	950	1200	60 - 140	79
		TRH C15-C28	µg/L	200	1200	1200	60 - 140	101
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	110
	TRH F Bands	TRH >C10-C16	µg/L	60	1100	1200	60 - 140	89
		TRH >C16-C34 (F3)	µg/L	500	1300	1200	60 - 140	110
		TRH >C34-C40 (F4)	µg/L	500	640	600	60 - 140	107

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155626.002	Monocyclic	Benzene	mg/kg	0.1	2.9	2.9	60 - 140	99
	Aromatic	Toluene	mg/kg	0.1	2.1	2.9	60 - 140	72
		Ethylbenzene	mg/kg	0.1	2.0	2.9	60 - 140	69
		m/p-xylene	mg/kg	0.2	4.0	5.8	60 - 140	68
		o-xylene	mg/kg	0.1	1.8	2.9	60 - 140	62
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.4	5	60 - 140	128
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	5	60 - 140	89
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140	95

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155745.002	Monocyclic	Benzene	µg/L	0.5	51	45.45	60 - 140	113
	Aromatic	Toluene	µg/L	0.5	51	45.45	60 - 140	112
		Ethylbenzene	µg/L	0.5	51	45.45	60 - 140	113
		m/p-xylene	µg/L	1	100	90.9	60 - 140	113
		o-xylene	µg/L	0.5	51	45.45	60 - 140	113
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	5	60 - 140	89
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.4	5	60 - 140	88
		d8-toluene (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		Bromofluorobenzene (Surrogate)	µg/L	-	4.9	5	60 - 140	97

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155626.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	88
		TRH C6-C9	mg/kg	20	20	23.2	60 - 140	87
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.4	5	60 - 140	128
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	5	60 - 140	89
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140	95
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	124

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155745.002		TRH C6-C10	µg/L	50	940	946.63	60 - 140	100
		TRH C6-C9	µg/L	40	770	818.71	60 - 140	94
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	5	60 - 140	89
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.4	5	60 - 140	88
		d8-toluene (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		Bromofluorobenzene (Surrogate)	µg/L	-	4.9	5	60 - 140	97
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	640	639.67	60 - 140	99

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155630.004	Mercury	mg/kg	0.05	0.20	<0.05	0.2	90

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.003	LB155627.027		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	-	-
			Lindane	mg/kg	0.1	<0.1	<0.1	-	-
			Heptachlor	mg/kg	0.1	0.2	<0.1	0.2	122
			Aldrin	mg/kg	0.1	0.2	<0.1	0.2	117
			Beta BHC	mg/kg	0.1	<0.1	<0.1	-	-
			Delta BHC	mg/kg	0.1	0.2	<0.1	0.2	116
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	-	-
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	-	-
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
			Dieldrin	mg/kg	0.2	0.2	<0.2	0.2	112
			Endrin	mg/kg	0.2	0.2	<0.2	0.2	105
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	-	-
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
			p,p'-DDT	mg/kg	0.1	0.2	<0.1	0.2	97
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	-	-
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	-	-
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	-	-
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	-	-
			Isodrin	mg/kg	0.1	<0.1	<0.1	-	-
			Mirex	mg/kg	0.1	<0.1	<0.1	-	-
			Total CLP OC Pesticides	mg/kg	1	1	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.18	-	91

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE183216.001	LB155627.025		Dichlorvos	mg/kg	0.5	<0.5	2	110
			Dimethoate	mg/kg	0.5	<0.5	-	-
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	2	92
			Fenitrothion	mg/kg	0.2	<0.2	-	-
			Malathion	mg/kg	0.2	<0.2	-	-
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	2	99
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	-	-
			Bromophos Ethyl	mg/kg	0.2	<0.2	-	-
			Methidathion	mg/kg	0.5	<0.5	-	-
			Ethion	mg/kg	0.2	<0.2	2	103
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	-	-
			Total OP Pesticides*	mg/kg	1.7	<1.7	-	-
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	-	90
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	-	100

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183216.001	LB155627.025	Naphthalene	mg/kg	0.1	4.7	<0.1	4	117
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Acenaphthylene	mg/kg	0.1	4.5	<0.1	4	112
		Acenaphthene	mg/kg	0.1	4.3	<0.1	4	108
		Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
		Phenanthrene	mg/kg	0.1	4.7	<0.1	4	117

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183216.001	LB155627.025		Anthracene	mg/kg	0.1	4.7	<0.1	4	118
			Fluoranthene	mg/kg	0.1	4.7	<0.1	4	117
			Pyrene	mg/kg	0.1	4.9	<0.1	4	122
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Chrysene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(a)pyrene	mg/kg	0.1	4.3	<0.1	4	106
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	4.3	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	4.4	<0.3	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.3	<0.2	-	-
			Total PAH (18)	mg/kg	0.8	37	<0.8	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	-	76
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	90
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	-	100

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.003	LB155627.024		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1260	mg/kg	0.2	0.5	<0.2	0.4	124
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	-	-
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	-	107

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155629.004	Arsenic, As	mg/kg	1	54	10	50	87
		Cadmium, Cd	mg/kg	0.3	47	0.3	50	94
		Chromium, Cr	mg/kg	0.3	67	22	50	89
		Copper, Cu	mg/kg	0.5	66	16	50	101
		Nickel, Ni	mg/kg	0.5	56	9.3	50	93
		Lead, Pb	mg/kg	1	58	15	50	86
		Zinc, Zn	mg/kg	2	93	42	50	103

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.002	LB155627.024		TRH C10-C14	mg/kg	20	47	<20	40	118
			TRH C15-C28	mg/kg	45	<45	<45	40	98
			TRH C29-C36	mg/kg	45	<45	<45	40	73
			TRH C37-C40	mg/kg	100	<100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	<110	<110	-	-
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
		TRH F Bands	TRH >C10-C16	mg/kg	25	42	<25	40	105
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	42	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	85
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004	Monocyclic	Benzene	mg/kg	0.1	2.7	<0.1	2.9	94
		Aromatic	Toluene	mg/kg	0.1	1.9	<0.1	2.9	63
			Ethylbenzene	mg/kg	0.1	2.1	<0.1	2.9	71
			m/p-xylene	mg/kg	0.2	4.2	<0.2	5.8	72
			o-xylene	mg/kg	0.1	1.9	<0.1	2.9	65

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.9	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	4.5	-	81
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.4	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.6	4.0	-	112
		Totals	Total Xylenes	mg/kg	0.3	6.1	<0.3	-	-
			Total BTEX	mg/kg	0.6	13	<0.6	-	-

VOCs in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183221.013	LB155745.024	Monocyclic	Benzene	µg/L	0.5	54	<0.5	45.45	118
		Aromatic	Toluene	µg/L	0.5	55	<0.5	45.45	120
			Ethylbenzene	µg/L	0.5	52	<0.5	45.45	115
			m/p-xylene	µg/L	1	95	<1	90.9	105
			o-xylene	µg/L	0.5	48	<0.5	45.45	106
		Polycyclic	Naphthalene	µg/L	0.5	54	<0.5	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	4.6	-	90
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	-	103
			d8-toluene (Surrogate)	µg/L	-	4.8	4.5	-	96
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	4.2	-	93

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	72
			TRH C6-C9	mg/kg	20	<20	<20	23.2	73
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.9	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	4.5	-	81
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.4	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.6	4.0	-	112
		VPH F	Benzene (F0)	mg/kg	0.1	2.7	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	70

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183221.013	LB155745.024		TRH C6-C10	µg/L	50	900	<50	946.63	95
			TRH C6-C9	µg/L	40	750	<40	818.71	91
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	4.6	-	90
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	-	103
			d8-toluene (Surrogate)	µg/L	-	4.8	4.5	-	96
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	4.2	-	93
		VPH F	Benzene (F0)	µg/L	0.5	54	<0.5	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	600	<50	639.67	94

MATRIX SPIKE DUPLICATES

SE183216 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

CHAIN OF CUSTODY RECORD

Cardno
Shaping the Future

LAB Name	SGS
Address	16/33 Maddox St Alexandria NSW 2015

Client	Cardno (NSW/ACT) Pty Ltd PO Box 74 Broadmeadow NSW 2292

Contact Numbers	
Phone	0249 654555
Fax	0249 654666

Contact	Daniel McCallum
Sampled by	Daniel McCallum
Project Ref:	82219014

E-mail	daniel.mccallum@cardno.com.au	dimce.stojanvoski@cardno.com.au

(invoice to geotech@cardno.com.au)

Date Results Required	Standard TAT

Laboratory LIMS ID	Client Sample ID	Date Sampled	Matrix: Soil	Matrix: Water	Containers/Preservation: Soil Jar (G) Nat. Orange	0.5-1.0 litre (G) Nat. Yellow	0.1-1.0 litre (P) Nat. Green	50mL VOA Vial (G) H_2SO_4 Maroon	0.1-1.0 litre (P) H_2SO_4 Maroon	0.2-1.0 litre (G) H_2SO_4 Maroon	0.1-0.2 (P) Filtered?? Y=Yes, N=No (HNO_3) Red	0.2l (P) NaOH Blue	Other	Analysis Required: CL17	Asbestos ID				
1	TP203 ~~0.2~~ 0.4 -0.5	24/08/2018	☒											☒	☒				

SGS EHS Alexandria Laboratory

SE183218 COC

Received: 29 – Aug – 2018

Released by: Daniel McCallum Signature [signature] Date/Time 28/8/2018

Received by: Nessa Signature [signature] Date/Time 29/8/18 10:30

Custody Seals Intact? / Samples Received Chilled?

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183218 R0**
Date Received	29/8/2018
Date Reported	5/9/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemist

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

Shane McDermott
Inorganic/Metals Chemist

VOC's in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1
Lindane	mg/kg	0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1
Aldrin	mg/kg	0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2
Endrin	mg/kg	0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1
Isodrin	mg/kg	0.1	<0.1
Mirex	mg/kg	0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1

OP Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Dichlorvos	mg/kg	0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2
Malathion	mg/kg	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2
Methidathion	mg/kg	0.5	<0.5
Ethion	mg/kg	0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7

PCBs in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Arochlor 1016	mg/kg	0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Arsenic, As	mg/kg	1	**5**
Cadmium, Cd	mg/kg	0.3	**0.4**
Chromium, Cr	mg/kg	0.3	**4.1**
Copper, Cu	mg/kg	0.5	**9.8**
Lead, Pb	mg/kg	1	**16**
Nickel, Ni	mg/kg	0.5	**1.1**
Zinc, Zn	mg/kg	2	**150**

Mercury in Soil [AN312] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
% Moisture	%w/w	0.5	**11**

Fibre Identification in soil [AN602] Tested: 4/9/2018

PARAMETER	UOM	LOR	TP203 0.4-0.5 SOIL - 24/8/2018 SE183218.001
Asbestos Detected	No unit	-	No
Estimated Fibres*	%w/w	0.01	<0.01

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183218 R0**
Date Received	29 Aug 2018
Date Reported	05 Sep 2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

No respirable fibres detected in all soil samples using trace analysis technique.

A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemis

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

Shane McDermott
Inorganic/Metals Chemist

ANALYTICAL REPORT

SE183218 R0

RESULTS

Fibre Identification in soil — Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE183218.001	TP203 0.4-0.5	Soil	41g Sand,Soil,Rocks	24 Aug 2018	No Asbestos Found Synthetic Mineral Fibres Detected Organic Fibres Detected	<0.01

METHOD SUMMARY

SE183218 R0

METHOD	METHODOLOGY SUMMARY
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples , Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service .
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.
Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.
Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos -containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE183218 R0

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
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Project	**82219014**
Order Number	(Not specified)
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183218 R0**
Date Received	29 Aug 2018
Date Reported	05 Sep 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	30/8/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.1°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE183218 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Fibre Identification in soil

Method: ME-(AU)-[ENV]AN602

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155838	24 Aug 2018	29 Aug 2018	24 Aug 2019	04 Sep 2018	24 Aug 2019	05 Sep 2018

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155658	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	05 Sep 2018

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155654	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155656	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155656	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155656	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155656	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155657	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155656	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155655	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP203 0.4-0.5	SE183218.001	LB155655	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	123

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	90
d14-p-terphenyl (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	88

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP203 0.4-0.5	SE183218.001	%	70 - 130%	90
d14-p-terphenyl (Surrogate)	TP203 0.4-0.5	SE183218.001	%	70 - 130%	88
d5-nitrobenzene (Surrogate)	TP203 0.4-0.5	SE183218.001	%	70 - 130%	76

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	123

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	80
d4-1,2-dichloroethane (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	89
d8-toluene (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	83
Dibromofluoromethane (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	92

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	80
d4-1,2-dichloroethane (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	89
d8-toluene (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	83
Dibromofluoromethane (Surrogate)	TP203 0.4-0.5	SE183218.001	%	60 - 130%	92

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB155658.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155656.001		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
		Alpha BHC	mg/kg	0.1	<0.1
		Lindane	mg/kg	0.1	<0.1
		Heptachlor	mg/kg	0.1	<0.1
		Aldrin	mg/kg	0.1	<0.1
		Beta BHC	mg/kg	0.1	<0.1
		Delta BHC	mg/kg	0.1	<0.1
		Heptachlor epoxide	mg/kg	0.1	<0.1
		Alpha Endosulfan	mg/kg	0.2	<0.2
		Gamma Chlordane	mg/kg	0.1	<0.1
		Alpha Chlordane	mg/kg	0.1	<0.1
		p,p'-DDE	mg/kg	0.1	<0.1
		Dieldrin	mg/kg	0.2	<0.2
		Endrin	mg/kg	0.2	<0.2
		Beta Endosulfan	mg/kg	0.2	<0.2
		p,p'-DDD	mg/kg	0.1	<0.1
		p,p'-DDT	mg/kg	0.1	<0.1
		Endosulfan sulphate	mg/kg	0.1	<0.1
		Endrin Aldehyde	mg/kg	0.1	<0.1
		Methoxychlor	mg/kg	0.1	<0.1
		Endrin Ketone	mg/kg	0.1	<0.1
		Isodrin	mg/kg	0.1	<0.1
		Mirex	mg/kg	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	73

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155656.001		Dichlorvos	mg/kg	0.5	<0.5
		Dimethoate	mg/kg	0.5	<0.5
		Diazinon (Dimpylate)	mg/kg	0.5	<0.5
		Fenitrothion	mg/kg	0.2	<0.2
		Malathion	mg/kg	0.2	<0.2
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
		Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
		Bromophos Ethyl	mg/kg	0.2	<0.2
		Methidathion	mg/kg	0.5	<0.5
		Ethion	mg/kg	0.2	<0.2
		Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	96
		d14-p-terphenyl (Surrogate)	%	-	98

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB155656.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1
	Fluoranthene	mg/kg	0.1	<0.1
	Pyrene	mg/kg	0.1	<0.1
	Benzo(a)anthracene	mg/kg	0.1	<0.1
	Chrysene	mg/kg	0.1	<0.1
	Benzo(a)pyrene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155656.001		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	80
		2-fluorobiphenyl (Surrogate)	%	-	96
		d14-p-terphenyl (Surrogate)	%	-	98

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155656.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	73

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number		Parameter	Units	LOR	Result
LB155657.001		Arsenic, As	mg/kg	1	2
		Cadmium, Cd	mg/kg	0.3	<0.3
		Chromium, Cr	mg/kg	0.3	<0.3
		Copper, Cu	mg/kg	0.5	<0.5
		Nickel, Ni	mg/kg	0.5	<0.5
		Lead, Pb	mg/kg	1	<1
		Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result
LB155656.001		TRH C10-C14	mg/kg	20	<20
		TRH C15-C28	mg/kg	45	<45
		TRH C29-C36	mg/kg	45	<45
		TRH C37-C40	mg/kg	100	<100
		TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155655.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	88
		d4-1,2-dichloroethane (Surrogate)	%	-	87
		d8-toluene (Surrogate)	%	-	85
		Bromofluorobenzene (Surrogate)	%	-	83
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155655.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	88
		d4-1,2-dichloroethane (Surrogate)	%	-	87
		d8-toluene (Surrogate)	%	-	85

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183280.003	LB155658.014	Mercury	mg/kg	0.05	0.00463406890.0038791069		200	0
SE183286.001	LB155658.020	Mercury	mg/kg	0.05	0.03321305560.0370238676		172	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183248.004	LB155654.011	% Moisture	%w/w	0.5	18	20	35	12
SE183286.001	LB155654.021	% Moisture	%w/w	0.5	6.63507109006.7574931880		45	2

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183286.001	LB155656.024		Hexachlorobenzene (HCB)	mg/kg	0.1	0	0	200	0
			Alpha BHC	mg/kg	0.1	0	0	200	0
			Lindane	mg/kg	0.1	0	0	200	0
			Heptachlor	mg/kg	0.1	0	0	200	0
			Aldrin	mg/kg	0.1	0	0	200	0
			Beta BHC	mg/kg	0.1	0	0	200	0
			Delta BHC	mg/kg	0.1	0	0	200	0
			Heptachlor epoxide	mg/kg	0.1	0	0	200	0
			o,p'-DDE	mg/kg	0.1	0	0	200	0
			Alpha Endosulfan	mg/kg	0.2	0	0	200	0
			Gamma Chlordane	mg/kg	0.1	0	0	200	0
			Alpha Chlordane	mg/kg	0.1	0	0	200	0
			trans-Nonachlor	mg/kg	0.1	0	0	200	0
			p,p'-DDE	mg/kg	0.1	0	0	200	0
			Dieldrin	mg/kg	0.2	0	0	200	0
			Endrin	mg/kg	0.2	0	0	200	0
			o,p'-DDD	mg/kg	0.1	0	0	200	0
			o,p'-DDT	mg/kg	0.1	0	0	200	0
			Beta Endosulfan	mg/kg	0.2	0	0	200	0
			p,p'-DDD	mg/kg	0.1	0	0	200	0
			p,p'-DDT	mg/kg	0.1	0	0	200	0
			Endosulfan sulphate	mg/kg	0.1	0	0	200	0
			Endrin Aldehyde	mg/kg	0.1	0	0	200	0
			Methoxychlor	mg/kg	0.1	0	0	200	0
			Endrin Ketone	mg/kg	0.1	0	0	200	0
			Isodrin	mg/kg	0.1	0	0	200	0
			Mirex	mg/kg	0.1	0	0	200	0
			Total CLP OC Pesticides	mg/kg	1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.175	0.19	30	8

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183286.001	LB155656.024		Dichlorvos	mg/kg	0.5	0	0	200	0
			Dimethoate	mg/kg	0.5	0	0	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	0.05	0	200	0
			Fenitrothion	mg/kg	0.2	0	0	200	0
			Malathion	mg/kg	0.2	0	0	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	0.07	0.05	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	0	0	200	0
			Bromophos Ethyl	mg/kg	0.2	0.08	0.03	200	0
			Methidathion	mg/kg	0.5	0	0	200	0
			Ethion	mg/kg	0.2	0	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	0	0	200	0
			Total OP Pesticides*	mg/kg	1.7	0	0	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.44	0.56	30	24
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.49	0.53	30	8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183280.001	LB155656.026		Naphthalene	mg/kg	0.1	0	0	200	0
			2-methylnaphthalene	mg/kg	0.1	0	0	200	0
			1-methylnaphthalene	mg/kg	0.1	0	0	200	0
			Acenaphthylene	mg/kg	0.1	0	0	200	0
			Acenaphthene	mg/kg	0.1	0	0	200	0
			Fluorene	mg/kg	0.1	0	0	200	0
			Phenanthrene	mg/kg	0.1	0	0	200	0
			Anthracene	mg/kg	0.1	0	0	200	0
			Fluoranthene	mg/kg	0.1	0	0	200	0
			Pyrene	mg/kg	0.1	0	0	200	0
			Benzo(a)anthracene	mg/kg	0.1	0.01	0	200	0
			Chrysene	mg/kg	0.1	0	0	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	0	0	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	0	0	200	0
			Benzo(a)pyrene	mg/kg	0.1	0.01	0.01	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0	0	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	0	0	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0	0	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	0	0	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	0.242	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	0.121	0.121	175	0
			Total PAH (18)	mg/kg	0.8	0	0	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.39	0.38	30	3
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.44	0.42	30	5
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.47	0.44	30	7

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183286.001	LB155656.024		Arochlor 1016	mg/kg	0.2	0	0	200	0
			Arochlor 1221	mg/kg	0.2	0	0	200	0
			Arochlor 1232	mg/kg	0.2	0	0	200	0
			Arochlor 1242	mg/kg	0.2	0	0	200	0
			Arochlor 1248	mg/kg	0.2	0	0	200	0
			Arochlor 1254	mg/kg	0.2	0	0	200	0
			Arochlor 1260	mg/kg	0.2	0	0	200	0
			Arochlor 1262	mg/kg	0.2	0	0	200	0
			Arochlor 1268	mg/kg	0.2	0	0	200	0
			Total PCBs (Arochlors)	mg/kg	1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.175	0.19	30	8

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183280.003	LB155657.014	Arsenic, As	mg/kg	1	4.72279764036	1.295168067	48	26
		Cadmium, Cd	mg/kg	0.3	0.08737830970	1.480336134	200	0
		Chromium, Cr	mg/kg	0.3	12.96694116242	.3654327731	34	5
		Copper, Cu	mg/kg	0.5	8.48880278927	.6931218487	36	10
		Nickel, Ni	mg/kg	0.5	6.57958672197	.2443949579	37	10
		Lead, Pb	mg/kg	1	10.31064054690	.427117647(	40	1
		Zinc, Zn	mg/kg	2	17.84265084476	.242063025:	42	9
SE183286.001	LB155657.020	Arsenic, As	mg/kg	1	3.59147127542	.7524779069	62	26
		Cadmium, Cd	mg/kg	0.3	0.12325759400	.0830310077	200	0
		Chromium, Cr	mg/kg	0.3	7.960740472111	.300520155(	35	35
		Copper, Cu	mg/kg	0.5	16.38900974942	.0519507751	34	30
		Nickel, Ni	mg/kg	0.5	6.35414148735	.9989903100	38	6
		Lead, Pb	mg/kg	1	22.46263395379	.371134108:	35	15
		Zinc, Zn	mg/kg	2	31.33293046497	.213412790(	37	14

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183280.001	LB155656.026	TRH C10-C14	mg/kg	20	0	0	200	0
		TRH C15-C28	mg/kg	45	0	0	200	0
		TRH C29-C36	mg/kg	45	0	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183280.001	LB155656.026		TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	0	0	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	0	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0
SE183286.001	LB155656.024		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	0	0	200	0
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	0	0	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	0	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183279.001	LB155655.025	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	3.9	50	12
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	3.9	50	13
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.6	50	11
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.1	3.6	50	14
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE183286.001	LB155655.024	Monocyclic	Benzene	mg/kg	0.1	0	0	200	0
		Aromatic	Toluene	mg/kg	0.1	0.01	0.01	200	0
			Ethylbenzene	mg/kg	0.1	0	0	200	0
			m/p-xylene	mg/kg	0.2	0.02	0.01	200	0
			o-xylene	mg/kg	0.1	0.01	0.01	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.55	4.36	50	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.59	4.47	50	3
			d8-toluene (Surrogate)	mg/kg	-	4.13	3.92	50	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.12	3.9	50	5
		Totals	Total Xylenes	mg/kg	0.3	0.03	0.02	200	0
			Total BTEX	mg/kg	0.6	0.04	0.03	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183279.001	LB155655.025		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.4	3.9	30	12
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	3.9	30	13
			d8-toluene (Surrogate)	mg/kg	-	4.1	3.6	30	11
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.1	3.6	30	14
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE183286.001	LB155655.024		TRH C6-C10	mg/kg	25	0	0	200	0
			TRH C6-C9	mg/kg	20	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.55	4.36	30	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.59	4.47	30	3
			d8-toluene (Surrogate)	mg/kg	-	4.13	3.92	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.12	3.9	30	5
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183286.001	LB155655.024	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	-0.04	-0.03	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155658.002	Mercury	mg/kg	0.05	0.18	0.2	70 - 130	89

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155656.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	104
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	106
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	104
		Dieldrin	mg/kg	0.2	<0.2	0.2	60 - 140	96
		Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	89
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	79
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.18	0.15	40 - 130	117

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155656.002		Dichlorvos	mg/kg	0.5	2.0	2	60 - 140	98
		Diazinon (Dimpylate)	mg/kg	0.5	2.0	2	60 - 140	102
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.0	2	60 - 140	101
		Ethion	mg/kg	0.2	1.9	2	60 - 140	95
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	86
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155656.002		Naphthalene	mg/kg	0.1	4.7	4	60 - 140	117
		Acenaphthylene	mg/kg	0.1	4.4	4	60 - 140	111
		Acenaphthene	mg/kg	0.1	4.5	4	60 - 140	112
		Phenanthrene	mg/kg	0.1	4.6	4	60 - 140	116
		Anthracene	mg/kg	0.1	4.6	4	60 - 140	116
		Fluoranthene	mg/kg	0.1	4.7	4	60 - 140	117
		Pyrene	mg/kg	0.1	4.7	4	60 - 140	118
		Benzo(a)pyrene	mg/kg	0.1	4.5	4	60 - 140	112
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	76
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	86
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155656.002	Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	114

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155657.002	Arsenic, As	mg/kg	1	330	336.32	79 - 120	98
	Cadmium, Cd	mg/kg	0.3	430	416.6	69 - 131	104
	Chromium, Cr	mg/kg	0.3	33	35.2	80 - 120	93
	Copper, Cu	mg/kg	0.5	320	370.46	80 - 120	87
	Nickel, Ni	mg/kg	0.5	180	210.88	79 - 120	84
	Lead, Pb	mg/kg	1	93	107.87	79 - 120	86
	Zinc, Zn	mg/kg	2	290	301.27	80 - 121	97

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155656.002		TRH C10-C14	mg/kg	20	33	40	60 - 140	83
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	93
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	65
	TRH F Bands	TRH >C10-C16	mg/kg	25	34	40	60 - 140	85
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	80
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	75

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155655.002	Monocyclic	Benzene	mg/kg	0.1	3.3	2.9	60 - 140	112
	Aromatic	Toluene	mg/kg	0.1	2.4	2.9	60 - 140	82
		Ethylbenzene	mg/kg	0.1	2.5	2.9	60 - 140	87
		m/p-xylene	mg/kg	0.2	5.5	5.8	60 - 140	95
		o-xylene	mg/kg	0.1	2.6	2.9	60 - 140	90
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.7	5	60 - 140	95
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	5	60 - 140	95
		d8-toluene (Surrogate)	mg/kg	-	4.6	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	5	60 - 140	94

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155655.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	95
		TRH C6-C9	mg/kg	20	21	23.2	60 - 140	88
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.7	5	60 - 140	95
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	5	60 - 140	95
		d8-toluene (Surrogate)	mg/kg	-	4.6	5	60 - 140	91
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	5	60 - 140	94
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	98

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.001	LB155658.004	Mercury	mg/kg	0.05	0.18	<0.05	0.2	84

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.002	LB155656.025		Naphthalene	mg/kg	0.1	4.6	<0.1	4	114
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
			Acenaphthylene	mg/kg	0.1	4.4	<0.1	4	110
			Acenaphthene	mg/kg	0.1	4.3	<0.1	4	107
			Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
			Phenanthrene	mg/kg	0.1	4.5	<0.1	4	113
			Anthracene	mg/kg	0.1	4.5	<0.1	4	111
			Fluoranthene	mg/kg	0.1	4.6	<0.1	4	115
			Pyrene	mg/kg	0.1	4.6	<0.1	4	115
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Chrysene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(a)pyrene	mg/kg	0.1	4.8	<0.1	4	120
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	4.8	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	5.0	<0.3	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.9	<0.2	-	-
			Total PAH (18)	mg/kg	0.8	36	<0.8	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	-	76
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	-	84
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	-	96

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.001	LB155657.004	Arsenic, As	mg/kg	1	46	3	50	86
		Cadmium, Cd	mg/kg	0.3	47	<0.3	50	94
		Chromium, Cr	mg/kg	0.3	51	2.4	50	96
		Copper, Cu	mg/kg	0.5	54	3.1	50	101
		Nickel, Ni	mg/kg	0.5	48	1.2	50	94
		Lead, Pb	mg/kg	1	55	7	50	95
		Zinc, Zn	mg/kg	2	130	69	50	113

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.002	LB155656.025		TRH C10-C14	mg/kg	20	39	<20	40	98
			TRH C15-C28	mg/kg	45	<45	<45	40	110
			TRH C29-C36	mg/kg	45	<45	<45	40	90
			TRH C37-C40	mg/kg	100	<100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	<110	<110	-	-
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
		TRH F Bands	TRH >C10-C16	mg/kg	25	39	<25	40	98
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	39	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	110
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.001	LB155655.004	Monocyclic Aromatic	Benzene	mg/kg	0.1	3.2	<0.1	2.9	110
			Toluene	mg/kg	0.1	2.4	<0.1	2.9	81
			Ethylbenzene	mg/kg	0.1	2.6	<0.1	2.9	90
			m/p-xylene	mg/kg	0.2	5.8	<0.2	5.8	99
			o-xylene	mg/kg	0.1	2.8	<0.1	2.9	94

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.001	LB155655.004	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.5	4.4	-	90
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	4.4	-	90
			d8-toluene (Surrogate)	mg/kg	-	4.4	4.3	-	88
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.5	4.3	-	90
		Totals	Total Xylenes	mg/kg	0.3	8.5	<0.3	-	-
			Total BTEX	mg/kg	0.6	17	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183217.001	LB155655.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	97
			TRH C6-C9	mg/kg	20	21	<20	23.2	89
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.5	4.4	-	90
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	4.4	-	90
			d8-toluene (Surrogate)	mg/kg	-	4.4	4.3	-	88
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.5	4.3	-	90
		VPH F	Benzene (F0)	mg/kg	0.1	3.2	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	102

MATRIX SPIKE DUPLICATES

SE183218 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

CHAIN OF CUSTODY RECORD

Cardno
Shaping the Future

LAB Name	SGS
Address	16/33 Maddox St Alexandria NSW 2015

Client	Cardno (NSW/ACT) Pty Ltd PO Box 74 Broadmeadow NSW 2292

Contact Numbers	
Phone	0249 654555
Fax	0249 654666

Contact	Daniel McCallum
Sampled by	Daniel McCallum
Project Ref:	82219014

E-mail	daniel.mccallum@cardno.com.au	dimce.stojanvoski@cardno.com.au

(invoice to geotech@cardno.com.au)

Date Results Required	Standard TAT

Laboratory LIMS ID	Client Sample ID	Date Sampled	Matrix: Soil	Matrix: Water	Containers/Preservation: Soil Jar (G) Nat. Orange	0.5-1.0 litre (G) Nat. Yellow	0.1-1.0 litre (P) Nat. Green	50mL VOA Vial (G) H_2SO_4 Maroon	0.1-1.0 litre (P) H_2SO_4 Maroon	0.2-1.0 litre (G) H_2SO_4 Maroon	0.1-0.2 (P) Filtered?? Y=Yes, N=No (HNO_3) Red	0.2l (P) NaOH Blue	Other	Analysis Required: CL17	Asbestos ID				
1	TP201 0.1	24/08/2018	☒											☒	☒				
2	TP202 0.1	24/08/2018	☒											☒	☒				
3	TP204 0.1	24/08/2018	☒											☒	☒				
4	TP205 0.1	24/08/2018	☒											☒	☒				
5	DUP1	24/08/2018	☒											☒					

SGS EHS Alexandria Laboratory

SE183217 COC

Received: 29 – Aug – 2018

Released by: Daniel McCallum Signature Date/Time 28/8/2018

Received by: Nessa Signature Date/Time 29/8/18 10:30 *Custody Seals Intact? / Samples Received Chilled?*

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183216 R1**
Date Received	29/8/2018
Date Reported	8/10/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

This report cancels and supersedes the report No. SE183216 R0 dated 13.09.18 issued by SGS Environment, Health and Safety due to amended extration dates on VOC's and VPH's.

pH analysis was performed by SGS on sample outside of holding time.

Clay % subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146,

A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemist

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

VOC's in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8	<0.8	<0.8	<0.8

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 3/9/2018 (continued)

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1
Lindane	mg/kg	0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1
Aldrin	mg/kg	0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2
Endrin	mg/kg	0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1
Isodrin	mg/kg	0.1	<0.1
Mirex	mg/kg	0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1

OP Pesticides in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Dichlorvos	mg/kg	0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2
Malathion	mg/kg	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2
Methidathion	mg/kg	0.5	<0.5
Ethion	mg/kg	0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7

PCBs in Soil [AN420] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Arochlor 1016	mg/kg	0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1

pH in soil (1:5) [AN101] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
pH (CaCl2)*	pH Units	0.1	**4.1**

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
Exchangeable Sodium, Na	mg/kg	2	**8**
Exchangeable Sodium, Na	meq/100g	0.01	**0.04**
Exchangeable Sodium Percentage*	%	0.1	**5.7**
Exchangeable Potassium, K	mg/kg	2	**23**
Exchangeable Potassium, K	meq/100g	0.01	**0.06**
Exchangeable Potassium Percentage*	%	0.1	**9.5**
Exchangeable Calcium, Ca	mg/kg	2	**68**
Exchangeable Calcium, Ca	meq/100g	0.01	**0.34**
Exchangeable Calcium Percentage*	%	0.1	**54.0**
Exchangeable Magnesium, Mg	mg/kg	2	**24**
Exchangeable Magnesium, Mg	meq/100g	0.02	**0.19**
Exchangeable Magnesium Percentage*	%	0.1	**30.7**
Cation Exchange Capacity	meq/100g	0.02	**0.63**

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Arsenic, As	mg/kg	1	<1	1	2	2	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	2.7	1.3	3.0	3.5	1.5
Copper, Cu	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Lead, Pb	mg/kg	1	2	2	3	2	2
Nickel, Ni	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc, Zn	mg/kg	2	<2.0	2.4	3.0	2.5	<2.0

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Arsenic, As	mg/kg	1	1	<1	<1	1	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	0.9	2.3	0.5	1.4	1.0
Copper, Cu	mg/kg	0.5	<0.5	<0.5	0.8	<0.5	0.5
Lead, Pb	mg/kg	1	1	<1	<1	1	2
Nickel, Ni	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc, Zn	mg/kg	2	4.3	<2.0	2.6	2.5	3.2

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Arsenic, As	mg/kg	1	1
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	2.8
Copper, Cu	mg/kg	0.5	<0.5
Lead, Pb	mg/kg	1	2
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	<2.0

Mercury in Soil [AN312] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 3/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP102 0.1 SOIL - 24/8/2018 SE183216.002	TP103 0.1 SOIL - 24/8/2018 SE183216.003	TP104 0.1 SOIL - 24/8/2018 SE183216.004	TP105 0.1 SOIL - 24/8/2018 SE183216.005
% Moisture	%w/w	0.5	5.8	7.7	6.5	6.6	9.6

PARAMETER	UOM	LOR	TP106 0.1 SOIL - 24/8/2018 SE183216.006	TP107 0.25 SOIL - 24/8/2018 SE183216.007	TP108 0.1 SOIL - 24/8/2018 SE183216.008	TP109 0.1 SOIL - 24/8/2018 SE183216.009	TP110 0.1 SOIL - 24/8/2018 SE183216.010
% Moisture	%w/w	0.5	8.0	13	18	9.2	13

PARAMETER	UOM	LOR	DUP2 SOIL - 24/8/2018 SE183216.011
% Moisture	%w/w	0.5	8.0

Fibre Identification in soil [AN602] Tested: 4/9/2018

PARAMETER	UOM	LOR	TP101 0.1 SOIL - 24/8/2018 SE183216.001	TP109 0.1 SOIL - 24/8/2018 SE183216.009
Asbestos Detected	No unit	-	No	No
Estimated Fibres*	%w/w	0.01	<0.01	<0.01

VOCs in Water [AN433] Tested: 29/8/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 29/8/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 31/8/2018

PARAMETER	UOM	LOR	RINS 24.08.2018 WATER - 24/8/2018 SE183216.012
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60

Sample Subcontracted [] Tested: 13/9/2018

PARAMETER	UOM	LOR	TP103 0.1 SOIL - 24/8/2018 SE183216.003
Sample Subcontracted*	No unit	-	Subcontracted
SGS Cairns*	No unit	-	Subcontracted

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.

AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples, Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Daniel McCallum
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Project	**82219014**
Order Number	(Not specified)
Samples	2

LABORATORY DETAILS

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SGS Reference	**SE183216 R1**
Date Received	29 Aug 2018
Date Reported	08 Oct 2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

This report cancels and supersedes the report No. SE183216 R0 dated 13.09.18 issued by SGS Environment, Health and Safety due to amended extration dates on VOC's and VPH's.

pH analysis was performed by SGS on sample outside of holding time.

Clay % subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146,

A portion of the sample supplied has been sub-sampled for asbestos according to SGS In-house procedures. We therefore cannot guarantee that the sub-sample is representative of the entire sample supplied. SGS Environmental Services recommends supplying approximately 50-100g of sample in a separate container

Asbestos analysed by Approved Identifier Yusuf Kuthpudin.

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemis

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Ravee Sivasubramaniam
Hygiene Team Leader

ANALYTICAL REPORT

RESULTS

Fibre Identification in soil — Method AN602

Laboratory Reference	Client Reference	Matrix	Sample Description	Date Sampled	Fibre Identification	Est.%w/w*
SE183216.001	TP101 0.1	Soil	44g Sand,Soil	24 Aug 2018	No Asbestos Found	<0.01
SE183216.009	TP109 0.1	Soil	50g Sand,Soil	24 Aug 2018	No Asbestos Found Organic Fibres Detected	<0.01

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN602	Qualitative identification of chrysotile, amosite and crocidolite in bulk samples by polarised light microscopy (PLM) in conjunction with dispersion staining (DS). AS4964 provides the basis for this document. Unequivocal identification of the asbestos minerals present is made by obtaining sufficient diagnostic `clues`, which provide a reasonable degree of certainty, dispersion staining is a mandatory `clue` for positive identification. If sufficient `clues` are absent, then positive identification of asbestos is not possible. This procedure requires removal of suspect fibres/bundles from the sample which cannot be returned.
AN602	Fibres/material that cannot be unequivocably identified as one of the three asbestos forms, will be reported as unknown mineral fibres (umf) The fibres detected may or may not be asbestos fibres.
AN602	AS4964.2004 Method for the Qualitative Identification of Asbestos in Bulk Samples , Section 8.4, Trace Analysis Criteria, Note 4 states:"Depending upon sample condition and fibre type, the detection limit of this technique has been found to lie generally in the range of 1 in 1,000 to 1 in 10,000 parts by weight, equivalent to 1 to 0.1 g/kg."
AN602	The sample can be reported “no asbestos found at the reporting limit of 0.1 g/kg” (<0.01%w/w) where AN602 section 4.5 of this method has been followed, and if- (a) no trace asbestos fibres have been detected (i.e. no ‘respirable’ fibres): (b) the estimated weight of non-respirable asbestos fibre bundles and/or the estimated weight of asbestos in asbestos-containing materials are found to be less than 0.1g/kg: and (c) these non-respirable asbestos fibre bundles and/or the asbestos containing materials are only visible under stereo-microscope viewing conditions.

FOOTNOTES

Amosite	-	Brown Asbestos	NA	-	Not Analysed
Chrysotile	-	White Asbestos	LNR	-	Listed, Not Required
Crocidolite	-	Blue Asbestos	*	-	NATA accreditation does not cover the performance of this service .
Amphiboles	-	Amosite and/or Crocidolite	**	-	Indicative data, theoretical holding time exceeded.

(In reference to soil samples only) This report does not comply with the analytical reporting recommendations in the Western Australian Department of Health Guidelines for the Assessment and Remediation and Management of Asbestos Contaminated sites in Western Australia - May 2009.

Sampled by the client.

Where reported: 'Asbestos Detected': Asbestos detected by polarised light microscopy, including dispersion staining.
Where reported: 'No Asbestos Found': No Asbestos Found by polarised light microscopy, including dispersion staining.
Where reported: 'UMF Detected': Mineral fibres of unknown type detected by polarised light microscopy, including dispersion staining. Confirmation by another independent analytical technique may be necessary.

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos -containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE183216 R1

CLIENT DETAILS

Contact	Daniel McCallum
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4965 4555
Facsimile	61 2 4965 4666
Email	daniel.mccallum@cardno.com.au
Project	**82219014**
Order Number	(Not specified)
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183216 R1**
Date Received	29 Aug 2018
Date Reported	08 Oct 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	pH in soil (1:5)	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	12 Soil
Date documentation received	29/8/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.1°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE183216 R1

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP103 0.1	SE183216.003	LB155649	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018

Fibre Identification in soil

Method: ME-(AU)-[ENV]AN602

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155838	24 Aug 2018	29 Aug 2018	24 Aug 2019	04 Sep 2018	24 Aug 2019	05 Sep 2018
TP109 0.1	SE183216.009	LB155838	24 Aug 2018	29 Aug 2018	24 Aug 2019	04 Sep 2018	24 Aug 2019	05 Sep 2018

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018
DUP2	SE183216.011	LB155630	24 Aug 2018	29 Aug 2018	21 Sep 2018	03 Sep 2018	21 Sep 2018	04 Sep 2018

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018
DUP2	SE183216.011	LB155628	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	08 Sep 2018	04 Sep 2018

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

HOLDING TIME SUMMARY

SE183216 R1

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

OP Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP103 0.1	SE183216.003	LB155661	24 Aug 2018	29 Aug 2018	31 Aug 2018	03 Sep 2018†	04 Sep 2018	03 Sep 2018

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP102 0.1	SE183216.002	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP103 0.1	SE183216.003	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP104 0.1	SE183216.004	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP105 0.1	SE183216.005	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP106 0.1	SE183216.006	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP107 0.25	SE183216.007	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP108 0.1	SE183216.008	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP109 0.1	SE183216.009	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
TP110 0.1	SE183216.010	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018
DUP2	SE183216.011	LB155629	24 Aug 2018	29 Aug 2018	20 Feb 2019	03 Sep 2018	20 Feb 2019	04 Sep 2018

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP102 0.1	SE183216.002	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP103 0.1	SE183216.003	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP104 0.1	SE183216.004	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP105 0.1	SE183216.005	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP106 0.1	SE183216.006	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP107 0.25	SE183216.007	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP108 0.1	SE183216.008	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP109 0.1	SE183216.009	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
TP110 0.1	SE183216.010	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018
DUP2	SE183216.011	LB155627	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	04 Sep 2018

HOLDING TIME SUMMARY

SE183216 R1

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155528	24 Aug 2018	29 Aug 2018	31 Aug 2018	31 Aug 2018	10 Oct 2018	03 Sep 2018

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP102 0.1	SE183216.002	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP103 0.1	SE183216.003	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP104 0.1	SE183216.004	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP105 0.1	SE183216.005	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP106 0.1	SE183216.006	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155745	24 Aug 2018	29 Aug 2018	31 Aug 2018	29 Aug 2018	08 Oct 2018	05 Sep 2018

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101 0.1	SE183216.001	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP102 0.1	SE183216.002	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP103 0.1	SE183216.003	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP104 0.1	SE183216.004	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP105 0.1	SE183216.005	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP106 0.1	SE183216.006	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP107 0.25	SE183216.007	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP108 0.1	SE183216.008	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP109 0.1	SE183216.009	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
TP110 0.1	SE183216.010	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018
DUP2	SE183216.011	LB155626	24 Aug 2018	29 Aug 2018	07 Sep 2018	03 Sep 2018	13 Oct 2018	05 Sep 2018

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RINS 24.08.2018	SE183216.012	LB155745	24 Aug 2018	29 Aug 2018	31 Aug 2018	29 Aug 2018	08 Oct 2018	05 Sep 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	105
	TP102 0.1	SE183216.002	%	60 - 130%	117
	TP103 0.1	SE183216.003	%	60 - 130%	121
	TP104 0.1	SE183216.004	%	60 - 130%	119
	TP105 0.1	SE183216.005	%	60 - 130%	123
	TP106 0.1	SE183216.006	%	60 - 130%	117
	TP107 0.25	SE183216.007	%	60 - 130%	120
	TP108 0.1	SE183216.008	%	60 - 130%	122
	TP109 0.1	SE183216.009	%	60 - 130%	113
	TP110 0.1	SE183216.010	%	60 - 130%	121
	DUP2	SE183216.011	%	60 - 130%	123

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	88
	TP102 0.1	SE183216.002	%	60 - 130%	86
	TP103 0.1	SE183216.003	%	60 - 130%	82
	TP104 0.1	SE183216.004	%	60 - 130%	86
	TP105 0.1	SE183216.005	%	60 - 130%	90
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	88
	TP108 0.1	SE183216.008	%	60 - 130%	88
	TP109 0.1	SE183216.009	%	60 - 130%	90
	TP110 0.1	SE183216.010	%	60 - 130%	86
	DUP2	SE183216.011	%	60 - 130%	92
d14-p-terphenyl (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	102
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	98
	TP104 0.1	SE183216.004	%	60 - 130%	94
	TP105 0.1	SE183216.005	%	60 - 130%	96
	TP106 0.1	SE183216.006	%	60 - 130%	100
	TP107 0.25	SE183216.007	%	60 - 130%	98
	TP108 0.1	SE183216.008	%	60 - 130%	96
	TP109 0.1	SE183216.009	%	60 - 130%	102
	TP110 0.1	SE183216.010	%	60 - 130%	100
	DUP2	SE183216.011	%	60 - 130%	96

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	88
	TP102 0.1	SE183216.002	%	70 - 130%	86
	TP103 0.1	SE183216.003	%	70 - 130%	82
	TP104 0.1	SE183216.004	%	70 - 130%	86
	TP105 0.1	SE183216.005	%	70 - 130%	90
	TP106 0.1	SE183216.006	%	70 - 130%	86
	TP107 0.25	SE183216.007	%	70 - 130%	88
	TP108 0.1	SE183216.008	%	70 - 130%	88
	TP109 0.1	SE183216.009	%	70 - 130%	90
	TP110 0.1	SE183216.010	%	70 - 130%	86
	DUP2	SE183216.011	%	70 - 130%	92
d14-p-terphenyl (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	102
	TP102 0.1	SE183216.002	%	70 - 130%	90
	TP103 0.1	SE183216.003	%	70 - 130%	98
	TP104 0.1	SE183216.004	%	70 - 130%	94
	TP105 0.1	SE183216.005	%	70 - 130%	96
	TP106 0.1	SE183216.006	%	70 - 130%	100
	TP107 0.25	SE183216.007	%	70 - 130%	98
	TP108 0.1	SE183216.008	%	70 - 130%	96
	TP109 0.1	SE183216.009	%	70 - 130%	102
	TP110 0.1	SE183216.010	%	70 - 130%	100
	DUP2	SE183216.011	%	70 - 130%	96
d5-nitrobenzene (Surrogate)	TP101 0.1	SE183216.001	%	70 - 130%	80

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d5-nitrobenzene (Surrogate)	TP102 0.1	SE183216.002	%	70 - 130%	82
	TP103 0.1	SE183216.003	%	70 - 130%	92
	TP104 0.1	SE183216.004	%	70 - 130%	84
	TP105 0.1	SE183216.005	%	70 - 130%	86
	TP106 0.1	SE183216.006	%	70 - 130%	80
	TP107 0.25	SE183216.007	%	70 - 130%	84
	TP108 0.1	SE183216.008	%	70 - 130%	84
	TP109 0.1	SE183216.009	%	70 - 130%	82
	TP110 0.1	SE183216.010	%	70 - 130%	82
	DUP2	SE183216.011	%	70 - 130%	82

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	105
	TP102 0.1	SE183216.002	%	60 - 130%	117
	TP103 0.1	SE183216.003	%	60 - 130%	121
	TP104 0.1	SE183216.004	%	60 - 130%	119
	TP105 0.1	SE183216.005	%	60 - 130%	123
	TP106 0.1	SE183216.006	%	60 - 130%	117
	TP107 0.25	SE183216.007	%	60 - 130%	120
	TP108 0.1	SE183216.008	%	60 - 130%	122
	TP109 0.1	SE183216.009	%	60 - 130%	113
	TP110 0.1	SE183216.010	%	60 - 130%	121
	DUP2	SE183216.011	%	60 - 130%	123

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	77
	TP103 0.1	SE183216.003	%	60 - 130%	75
	TP104 0.1	SE183216.004	%	60 - 130%	74
	TP105 0.1	SE183216.005	%	60 - 130%	78
	TP106 0.1	SE183216.006	%	60 - 130%	75
	TP107 0.25	SE183216.007	%	60 - 130%	75
	TP108 0.1	SE183216.008	%	60 - 130%	74
	TP109 0.1	SE183216.009	%	60 - 130%	82
	TP110 0.1	SE183216.010	%	60 - 130%	75
	DUP2	SE183216.011	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	98
	TP102 0.1	SE183216.002	%	60 - 130%	99
	TP103 0.1	SE183216.003	%	60 - 130%	79
	TP104 0.1	SE183216.004	%	60 - 130%	95
	TP105 0.1	SE183216.005	%	60 - 130%	86
	TP106 0.1	SE183216.006	%	60 - 130%	93
	TP107 0.25	SE183216.007	%	60 - 130%	92
	TP108 0.1	SE183216.008	%	60 - 130%	93
	TP109 0.1	SE183216.009	%	60 - 130%	89
	TP110 0.1	SE183216.010	%	60 - 130%	82
	DUP2	SE183216.011	%	60 - 130%	85
d8-toluene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	70
	TP104 0.1	SE183216.004	%	60 - 130%	79
	TP105 0.1	SE183216.005	%	60 - 130%	76
	TP106 0.1	SE183216.006	%	60 - 130%	84
	TP107 0.25	SE183216.007	%	60 - 130%	82
	TP108 0.1	SE183216.008	%	60 - 130%	76
	TP109 0.1	SE183216.009	%	60 - 130%	80
	TP110 0.1	SE183216.010	%	60 - 130%	73
	DUP2	SE183216.011	%	60 - 130%	76
Dibromofluoromethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	85
	TP102 0.1	SE183216.002	%	60 - 130%	93

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	TP103 0.1	SE183216.003	%	60 - 130%	74
	TP104 0.1	SE183216.004	%	60 - 130%	81
	TP105 0.1	SE183216.005	%	60 - 130%	77
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	84
	TP108 0.1	SE183216.008	%	60 - 130%	79
	TP109 0.1	SE183216.009	%	60 - 130%	84
	TP110 0.1	SE183216.010	%	60 - 130%	77
	DUP2	SE183216.011	%	60 - 130%	79

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	114
d8-toluene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101
Dibromofluoromethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	77
	TP103 0.1	SE183216.003	%	60 - 130%	75
	TP104 0.1	SE183216.004	%	60 - 130%	74
	TP105 0.1	SE183216.005	%	60 - 130%	78
	TP106 0.1	SE183216.006	%	60 - 130%	75
	TP107 0.25	SE183216.007	%	60 - 130%	75
	TP108 0.1	SE183216.008	%	60 - 130%	74
	TP109 0.1	SE183216.009	%	60 - 130%	82
	TP110 0.1	SE183216.010	%	60 - 130%	75
	DUP2	SE183216.011	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	98
	TP102 0.1	SE183216.002	%	60 - 130%	99
	TP103 0.1	SE183216.003	%	60 - 130%	79
	TP104 0.1	SE183216.004	%	60 - 130%	95
	TP105 0.1	SE183216.005	%	60 - 130%	86
	TP106 0.1	SE183216.006	%	60 - 130%	93
	TP107 0.25	SE183216.007	%	60 - 130%	92
	TP108 0.1	SE183216.008	%	60 - 130%	93
	TP109 0.1	SE183216.009	%	60 - 130%	89
	TP110 0.1	SE183216.010	%	60 - 130%	82
	DUP2	SE183216.011	%	60 - 130%	85
d8-toluene (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	80
	TP102 0.1	SE183216.002	%	60 - 130%	90
	TP103 0.1	SE183216.003	%	60 - 130%	70
	TP104 0.1	SE183216.004	%	60 - 130%	79
	TP105 0.1	SE183216.005	%	60 - 130%	76
	TP106 0.1	SE183216.006	%	60 - 130%	84
	TP107 0.25	SE183216.007	%	60 - 130%	82
	TP108 0.1	SE183216.008	%	60 - 130%	76
	TP109 0.1	SE183216.009	%	60 - 130%	80
	TP110 0.1	SE183216.010	%	60 - 130%	73
	DUP2	SE183216.011	%	60 - 130%	76
Dibromofluoromethane (Surrogate)	TP101 0.1	SE183216.001	%	60 - 130%	85
	TP102 0.1	SE183216.002	%	60 - 130%	93
	TP103 0.1	SE183216.003	%	60 - 130%	74
	TP104 0.1	SE183216.004	%	60 - 130%	81
	TP105 0.1	SE183216.005	%	60 - 130%	77
	TP106 0.1	SE183216.006	%	60 - 130%	86
	TP107 0.25	SE183216.007	%	60 - 130%	84
	TP108 0.1	SE183216.008	%	60 - 130%	79
	TP109 0.1	SE183216.009	%	60 - 130%	84
	TP110 0.1	SE183216.010	%	60 - 130%	77

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Dibromofluoromethane (Surrogate)	DUP2	SE183216.011	%	60 - 130%	79

Volatile Petroleum Hydrocarbons in Water — **Method: ME-(AU)-[ENV]AN433**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	85
d4-1,2-dichloroethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	60 - 130%	114
d8-toluene (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101
Dibromofluoromethane (Surrogate)	RINS 24.08.2018	SE183216.012	%	40 - 130%	101

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result
LB155649.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB155630.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
		Alpha BHC	mg/kg	0.1	<0.1
		Lindane	mg/kg	0.1	<0.1
		Heptachlor	mg/kg	0.1	<0.1
		Aldrin	mg/kg	0.1	<0.1
		Beta BHC	mg/kg	0.1	<0.1
		Delta BHC	mg/kg	0.1	<0.1
		Heptachlor epoxide	mg/kg	0.1	<0.1
		Alpha Endosulfan	mg/kg	0.2	<0.2
		Gamma Chlordane	mg/kg	0.1	<0.1
		Alpha Chlordane	mg/kg	0.1	<0.1
		p,p'-DDE	mg/kg	0.1	<0.1
		Dieldrin	mg/kg	0.2	<0.2
		Endrin	mg/kg	0.2	<0.2
		Beta Endosulfan	mg/kg	0.2	<0.2
		p,p'-DDD	mg/kg	0.1	<0.1
		p,p'-DDT	mg/kg	0.1	<0.1
		Endosulfan sulphate	mg/kg	0.1	<0.1
		Endrin Aldehyde	mg/kg	0.1	<0.1
		Methoxychlor	mg/kg	0.1	<0.1
		Endrin Ketone	mg/kg	0.1	<0.1
		Isodrin	mg/kg	0.1	<0.1
		Mirex	mg/kg	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	95

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Dichlorvos	mg/kg	0.5	<0.5
		Dimethoate	mg/kg	0.5	<0.5
		Diazinon (Dimpylate)	mg/kg	0.5	<0.5
		Fenitrothion	mg/kg	0.2	<0.2
		Malathion	mg/kg	0.2	<0.2
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
		Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
		Bromophos Ethyl	mg/kg	0.2	<0.2
		Methidathion	mg/kg	0.5	<0.5
		Ethion	mg/kg	0.2	<0.2
		Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	94
		d14-p-terphenyl (Surrogate)	%	-	98

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB155627.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	84
		2-fluorobiphenyl (Surrogate)	%	-	94
		d14-p-terphenyl (Surrogate)	%	-	98

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB155627.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	95

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB155629.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB155627.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB155528.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	74
		d4-1,2-dichloroethane (Surrogate)	%	-	72

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001	Surrogates	d8-toluene (Surrogate)	%	-	106
		Bromofluorobenzene (Surrogate)	%	-	74
	Totals	Total BTEX	mg/kg	0.6	<0.6

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155745.001	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5
	Hydrocarbons	Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	96
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	90

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155626.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	74
		d4-1,2-dichloroethane (Surrogate)	%	-	72
		d8-toluene (Surrogate)	%	-	106

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB155745.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	96
		d8-toluene (Surrogate)	%	-	98
		Bromofluorobenzene (Surrogate)	%	-	90

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155630.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE183216.011	LB155630.023	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155628.011	% Moisture	%w/w	0.5	6.5	6.2	46	5
SE183216.011	LB155628.020	% Moisture	%w/w	0.5	8.0	8.6	42	7

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.001	LB155627.028		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
			Endrin	mg/kg	0.2	<0.2	<0.2	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.16	0.19	30	17
SE183216.011	LB155627.023		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
			Endrin	mg/kg	0.2	<0.2	<0.2	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.011	LB155627.023		p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.19	0.19	30	3

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026		Dichlorvos	mg/kg	0.5	<0.5	<0.5	200	0
			Dimethoate	mg/kg	0.5	<0.5	<0.5	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	200	0
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	200	0
			Malathion	mg/kg	0.2	<0.2	<0.2	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	200	0
			Methidathion	mg/kg	0.5	<0.5	<0.5	200	0
			Ethion	mg/kg	0.2	<0.2	<0.2	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	200	0
			Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	0
SE183216.011	LB155627.023		Dichlorvos	mg/kg	0.5	<0.5	<0.5	200	0
			Dimethoate	mg/kg	0.5	<0.5	<0.5	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	200	0
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	200	0
			Malathion	mg/kg	0.2	<0.2	<0.2	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	200	0
			Methidathion	mg/kg	0.5	<0.5	<0.5	200	0
			Ethion	mg/kg	0.2	<0.2	<0.2	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	200	0
			Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
		Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
		Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
		Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
		Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
		Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
		Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
		Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
		Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
		Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
		Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
		Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	<0.2	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.026		Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	<0.3	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	2
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	0
SE183216.011	LB155627.023		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	<0.3	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0
			Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.001	LB155627.025		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	17
SE183216.011	LB155627.023		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	3

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate		Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES (continued)

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155629.014	Arsenic, As	mg/kg	1	2	3	73	41
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	3.0	3.3	46	7
		Copper, Cu	mg/kg	0.5	<0.5	<0.5	200	0
		Nickel, Ni	mg/kg	0.5	<0.5	<0.5	200	0
		Lead, Pb	mg/kg	1	3	3	64	4
		Zinc, Zn	mg/kg	2	3.0	3.0	97	3
SE183216.011	LB155629.023	Arsenic, As	mg/kg	1	1	<1	134	32
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	2.8	2.3	49	19
		Copper, Cu	mg/kg	0.5	<0.5	<0.5	200	0
		Nickel, Ni	mg/kg	0.5	<0.5	<0.5	200	0
		Lead, Pb	mg/kg	1	2	<1	129	63
		Zinc, Zn	mg/kg	2	<2.0	<2.0	200	0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.002	LB155627.025		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0
SE183216.011	LB155627.023		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155626.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	50	15
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	4.6	50	15
			d8-toluene (Surrogate)	mg/kg	-	3.5	4.1	50	16
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.5	50	7
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE183216.011	LB155626.023	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	4.2	50	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.5	50	6
			d8-toluene (Surrogate)	mg/kg	-	3.8	4.1	50	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	3.6	50	11

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.011	LB155626.023	Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.012	LB155745.022	Monocyclic	Benzene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatic	Toluene	µg/L	0.5	<0.5	<0.5	200	0
			Ethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			m/p-xylene	µg/L	1	<1	<1	200	0
			o-xylene	µg/L	0.5	<0.5	<0.5	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	<0.5	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.9	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.5	30	4
			d8-toluene (Surrogate)	µg/L	-	5.1	4.8	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.3	4.4	30	2

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.003	LB155626.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.3	30	15
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	4.6	30	15
			d8-toluene (Surrogate)	mg/kg	-	3.5	4.1	30	16
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.8	3.5	30	7
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE183216.011	LB155626.023		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	4.2	30	6
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	4.5	30	6
			d8-toluene (Surrogate)	mg/kg	-	3.8	4.1	30	7
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	3.6	30	11
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183216.012	LB155745.022		TRH C6-C10	µg/L	50	<50	<50	200	0
			TRH C6-C9	µg/L	40	<40	<40	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.9	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.5	30	4
			d8-toluene (Surrogate)	µg/L	-	5.1	4.8	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.3	4.4	30	2
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0
SE183244.010	LB155745.023		TRH C6-C10	µg/L	50	0	0	200	0
			TRH C6-C9	µg/L	40	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.8	5.31	30	10
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.45	6.05	30	10
			d8-toluene (Surrogate)	µg/L	-	4.8	5.22	30	8
			Bromofluorobenzene (Surrogate)	µg/L	-	4.21	4.16	30	1
		VPH F Bands	Benzene (F0)	µg/L	0.5	0.05	0.04	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	-0.16	-0.17	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155649.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	102
	Exchangeable Potassium, K	mg/kg	2	NA	238.12	80 - 120	97
	Exchangeable Calcium, Ca	mg/kg	2	NA	692	80 - 120	91
	Exchangeable Magnesium, Mg	mg/kg	2	NA	134.2	80 - 120	100

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155630.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	96

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	109
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	106
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	104
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	105
		Endrin	mg/kg	0.2	<0.2	0.2	60 - 140	99
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	89
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	40 - 130	96

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Dichlorvos	mg/kg	0.5	2.0	2	60 - 140	100
		Diazinon (Dimpylate)	mg/kg	0.5	2.3	2	60 - 140	117
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.2	2	60 - 140	108
		Ethion	mg/kg	0.2	1.8	2	60 - 140	89
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		Naphthalene	mg/kg	0.1	4.2	4	60 - 140	106
		Acenaphthylene	mg/kg	0.1	4.2	4	60 - 140	105
		Acenaphthene	mg/kg	0.1	3.9	4	60 - 140	97
		Phenanthrene	mg/kg	0.1	4.2	4	60 - 140	104
		Anthracene	mg/kg	0.1	4.1	4	60 - 140	103
		Fluoranthene	mg/kg	0.1	4.4	4	60 - 140	109
		Pyrene	mg/kg	0.1	4.3	4	60 - 140	108
		Benzo(a)pyrene	mg/kg	0.1	4.7	4	60 - 140	118
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	78
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	90
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002	Arochlor 1260	mg/kg	0.2	0.5	0.4	60 - 140	114

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155629.002	Arsenic, As	mg/kg	1	340	336.32	79 - 120	100
	Cadmium, Cd	mg/kg	0.3	430	416.6	69 - 131	103
	Chromium, Cr	mg/kg	0.3	38	35.2	80 - 120	109
	Copper, Cu	mg/kg	0.5	330	370.46	80 - 120	88
	Nickel, Ni	mg/kg	0.5	180	210.88	79 - 120	87
	Lead, Pb	mg/kg	1	92	107.87	79 - 120	85
	Zinc, Zn	mg/kg	2	290	301.27	80 - 121	96

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155627.002		TRH C10-C14	mg/kg	20	43	40	60 - 140	108
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	93
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	80
	TRH F Bands	TRH >C10-C16	mg/kg	25	39	40	60 - 140	98
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	83
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	95

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155528.002		TRH C10-C14	µg/L	50	950	1200	60 - 140	79
		TRH C15-C28	µg/L	200	1200	1200	60 - 140	101
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	110
	TRH F Bands	TRH >C10-C16	µg/L	60	1100	1200	60 - 140	89
		TRH >C16-C34 (F3)	µg/L	500	1300	1200	60 - 140	110
		TRH >C34-C40 (F4)	µg/L	500	640	600	60 - 140	107

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155626.002	Monocyclic	Benzene	mg/kg	0.1	2.9	2.9	60 - 140	99
	Aromatic	Toluene	mg/kg	0.1	2.1	2.9	60 - 140	72
		Ethylbenzene	mg/kg	0.1	2.0	2.9	60 - 140	69
		m/p-xylene	mg/kg	0.2	4.0	5.8	60 - 140	68
		o-xylene	mg/kg	0.1	1.8	2.9	60 - 140	62
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.4	5	60 - 140	128
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	5	60 - 140	89
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140	95

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155745.002	Monocyclic	Benzene	µg/L	0.5	51	45.45	60 - 140	113
	Aromatic	Toluene	µg/L	0.5	51	45.45	60 - 140	112
		Ethylbenzene	µg/L	0.5	51	45.45	60 - 140	113
		m/p-xylene	µg/L	1	100	90.9	60 - 140	113
		o-xylene	µg/L	0.5	51	45.45	60 - 140	113
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	5	60 - 140	89
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.4	5	60 - 140	88
		d8-toluene (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		Bromofluorobenzene (Surrogate)	µg/L	-	4.9	5	60 - 140	97

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155626.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	88
		TRH C6-C9	mg/kg	20	20	23.2	60 - 140	87
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	6.4	5	60 - 140	128
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	5	60 - 140	89
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140	95
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	124

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155745.002		TRH C6-C10	µg/L	50	940	946.63	60 - 140	100
		TRH C6-C9	µg/L	40	770	818.71	60 - 140	94
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	5	60 - 140	89
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.4	5	60 - 140	88
		d8-toluene (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		Bromofluorobenzene (Surrogate)	µg/L	-	4.9	5	60 - 140	97
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	640	639.67	60 - 140	99

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155630.004	Mercury	mg/kg	0.05	0.20	<0.05	0.2	90

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.003	LB155627.027		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	-	-
			Lindane	mg/kg	0.1	<0.1	<0.1	-	-
			Heptachlor	mg/kg	0.1	0.2	<0.1	0.2	122
			Aldrin	mg/kg	0.1	0.2	<0.1	0.2	117
			Beta BHC	mg/kg	0.1	<0.1	<0.1	-	-
			Delta BHC	mg/kg	0.1	0.2	<0.1	0.2	116
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	-	-
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	-	-
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
			Dieldrin	mg/kg	0.2	0.2	<0.2	0.2	112
			Endrin	mg/kg	0.2	0.2	<0.2	0.2	105
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	-	-
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
			p,p'-DDT	mg/kg	0.1	0.2	<0.1	0.2	97
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	-	-
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	-	-
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	-	-
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	-	-
			Isodrin	mg/kg	0.1	<0.1	<0.1	-	-
			Mirex	mg/kg	0.1	<0.1	<0.1	-	-
			Total CLP OC Pesticides	mg/kg	1	1	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.18	-	91

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183216.001	LB155627.025		Dichlorvos	mg/kg	0.5	2.2	<0.5	2	110
			Dimethoate	mg/kg	0.5	<0.5	<0.5	-	-
			Diazinon (Dimpylate)	mg/kg	0.5	1.8	<0.5	2	92
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	-	-
			Malathion	mg/kg	0.2	<0.2	<0.2	-	-
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.0	<0.2	2	99
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	-	-
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	-	-
			Methidathion	mg/kg	0.5	<0.5	<0.5	-	-
			Ethion	mg/kg	0.2	2.1	<0.2	2	103
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	-	-
			Total OP Pesticides*	mg/kg	1.7	8.0	<1.7	-	-
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	90
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	-	100

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183216.001	LB155627.025	Naphthalene	mg/kg	0.1	4.7	<0.1	4	117
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Acenaphthylene	mg/kg	0.1	4.5	<0.1	4	112
		Acenaphthene	mg/kg	0.1	4.3	<0.1	4	108
		Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
		Phenanthrene	mg/kg	0.1	4.7	<0.1	4	117

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183216.001	LB155627.025		Anthracene	mg/kg	0.1	4.7	<0.1	4	118
			Fluoranthene	mg/kg	0.1	4.7	<0.1	4	117
			Pyrene	mg/kg	0.1	4.9	<0.1	4	122
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Chrysene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(a)pyrene	mg/kg	0.1	4.3	<0.1	4	106
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	4.3	<0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	4.4	<0.3	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.3	<0.2	-	-
			Total PAH (18)	mg/kg	0.8	37	<0.8	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	-	76
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	90
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	-	100

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.003	LB155627.024		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1260	mg/kg	0.2	0.5	<0.2	0.4	124
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	-	-
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	-	-
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	-	107

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155629.004	Arsenic, As	mg/kg	1	54	10	50	87
		Cadmium, Cd	mg/kg	0.3	47	0.3	50	94
		Chromium, Cr	mg/kg	0.3	67	22	50	89
		Copper, Cu	mg/kg	0.5	66	16	50	101
		Nickel, Ni	mg/kg	0.5	56	9.3	50	93
		Lead, Pb	mg/kg	1	58	15	50	86
		Zinc, Zn	mg/kg	2	93	42	50	103

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.002	LB155627.024		TRH C10-C14	mg/kg	20	47	<20	40	118
			TRH C15-C28	mg/kg	45	<45	<45	40	98
			TRH C29-C36	mg/kg	45	<45	<45	40	73
			TRH C37-C40	mg/kg	100	<100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	<110	<110	-	-
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
		TRH F Bands	TRH >C10-C16	mg/kg	25	42	<25	40	105
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	42	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	85
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004	Monocyclic	Benzene	mg/kg	0.1	2.7	<0.1	2.9	94
		Aromatic	Toluene	mg/kg	0.1	1.9	<0.1	2.9	63
			Ethylbenzene	mg/kg	0.1	2.1	<0.1	2.9	71
			m/p-xylene	mg/kg	0.2	4.2	<0.2	5.8	72
			o-xylene	mg/kg	0.1	1.9	<0.1	2.9	65

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.9	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	4.5	-	81
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.4	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.6	4.0	-	112
		Totals	Total Xylenes	mg/kg	0.3	6.1	<0.3	-	-
			Total BTEX	mg/kg	0.6	13	<0.6	-	-

VOCs in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183221.013	LB155745.024	Monocyclic	Benzene	µg/L	0.5	54	<0.5	45.45	118
		Aromatic	Toluene	µg/L	0.5	55	<0.5	45.45	120
			Ethylbenzene	µg/L	0.5	52	<0.5	45.45	115
			m/p-xylene	µg/L	1	95	<1	90.9	105
			o-xylene	µg/L	0.5	48	<0.5	45.45	106
		Polycyclic	Naphthalene	µg/L	0.5	54	<0.5	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	4.6	-	90
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	-	103
			d8-toluene (Surrogate)	µg/L	-	4.8	4.5	-	96
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	4.2	-	93

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183339.001	LB155626.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	72
			TRH C6-C9	mg/kg	20	<20	<20	23.2	73
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	5.9	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	4.5	-	81
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.4	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.6	4.0	-	112
		VPH F	Benzene (F0)	mg/kg	0.1	2.7	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	70

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183221.013	LB155745.024		TRH C6-C10	µg/L	50	900	<50	946.63	95
			TRH C6-C9	µg/L	40	750	<40	818.71	91
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.5	4.6	-	90
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	-	103
			d8-toluene (Surrogate)	µg/L	-	4.8	4.5	-	96
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	4.2	-	93
		VPH F	Benzene (F0)	µg/L	0.5	54	<0.5	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	600	<50	639.67	94

MATRIX SPIKE DUPLICATES

SE183216 R1

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
0.63
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	80
Urban residential and open public spaces	#NUM!	95
Commercial and industrial	#NUM!	100

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
0.63
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	5
Urban residential and open public spaces	#NUM!	5
Commercial and industrial	#NUM!	5

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
0.63
Enter soil pH (calcium chloride method) (values from 1 to 14)
4.1
Enter organic carbon content (%OC) (values from 0 to 50%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	20
Urban residential and open public spaces	#NUM!	30
Commercial and industrial	#NUM!	35

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
15
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	#NUM!	150
Urban residential and open public spaces	#NUM!	460
Commercial and industrial	#NUM!	770

				ES_EPA8100	TRH	BTEX							TPH					CRC Care TPH Fractions							PAH											
				Total PAH (NEPM/WHO 16)	TRH C37-C40	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	F1: C6-C10 less BTEX	F2: >C10-C16 less Naphthalene	Benzo(b+j)fluoranthene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.8	100	0.1	0.1	0.1	0.2	0.1	0.3	0.6	20	20	45	45	110	25	25	90	120	210	25	25	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
CRCCARE 2011 Soil HSL for Direct Contact, HSL-A Residential 0-1m						100	14000	4500			12000							4400	3300	4500	6300														
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - aged 0-2m																																			
NEPM 2013 Sch B1 Table 7 Asbestos HSLs																																			
NEPM 2013 ESL UR/POS, Coarse Soil 0-2m						50	85	70			105			120					120	300	2800		180									0.7			
NEPM 2013 ESL UR/POS, Fine Soil 0-2m						65	105	125			45			120					120	1300	5600		180									0.7			
NEPM 2013 HIL, Residential A																																			
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Clay 0-1m						0.7	480	NL			110												50	280											
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand 0-1m						0.5	160	55			40												45	110											
NEPM 2013 Management Limits, C/I, Coarse Soil													700	1000				700	1000	3500	10000														
NEPM 2013 Management Limits, C/I, Fine Soil													800	1000				800	1000	5000	10000														
Field_ID	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**	**Matrix_Description**																																
TP101 0.1	TP101 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP102 0.1	TP102 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP103 0.1	TP103 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP104 0.1	TP104 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP105 0.1	TP105 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP106 0.1	TP106 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP107 0.25	TP107 0.25	0.2-0.3	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP108 0.1	TP108 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP109 0.1	TP109 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP110 0.1	TP110 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP201 0.1	TP201 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP202 0.1	TP202 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP203 0.4-0.5	TP203 0.4-0.5	0.4-0.5	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP204 0.1	TP204 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP205 0.1	TP205 0.1	0.09-0.11	24/08/2018		<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																			
Number of Results				15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration				<0.8	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<20	<20	<45	<45	<110	<25	<25	<90	<120	<210	<25	<25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration				0.4	50	0.05	0.05	0.05	0.1	0.05	0.15	0.3	10	10	23	23	55	13	13	45	60	105	13	13	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration				0.4	50	0.05	0.05	0.05	0.1	0.05	0.15	0.3	10	10	22.5	22.5	55	12.5	12.5	45	60	105	12.5	12.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

										Metals												Inorganics									
						Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene	Arsenic	Cadmium	Calcium	Chromium (III+VI)	Copper	Lead	Magnesium	Mercury	Nickel	Potassium	Sodium	Zinc	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	Exchangeable Sodium Percent	CEC	Moisture	pH (CaCl2)	2,4-DDT	4,4-DDE
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	%	meq/100g	%	pH Units	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.8	0.1	0.1	1	0.3	2	0.3	0.5	1	2	0.05	0.5	2	2	2	0.01	0.02	0.01	0.01	0.1	0.02	0.5	0.1	0.1	0.1
CRCCARE 2011 Soil HSL for Direct Contact, HSL-A Residential 0-1m										1400																							
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - aged 0-2m										170				100			460	30	1100			5			95									
NEPM 2013 Sch B1 Table 7 Asbestos HSLs																																		
NEPM 2013 ESL UR/POS, Coarse Soil 0-2m																																		
NEPM 2013 ESL UR/POS, Fine Soil 0-2m																																		
NEPM 2013 HIL, Residential A											300			100	20			6000	300		40	400			7400									
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Clay 0-1m										5																								
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand 0-1m										3																								
NEPM 2013 Management Limits, C/I, Coarse Soil																																		
NEPM 2013 Management Limits, C/I, Fine Soil																																		
Field_ID	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**	**Matrix_Description**																														
TP101 0.1	TP101 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<1	<0.3	-	2.7	<0.5	2	-	<0.05	<0.5	-	-	<2	-	-	-	-	-	-	5.8	-	<0.1	<0.1
TP102 0.1	TP102 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	1	<0.3	-	1.3	<0.5	2	-	<0.05	<0.5	-	-	2.4	-	-	-	-	-	-	7.7	-	<0.1	<0.1
TP103 0.1	TP103 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	2	<0.3	68	3	<0.5	3	24	<0.05	<0.5	23	8	3	0.34	0.19	0.06	0.04	5.7	0.63	6.5	4.1	<0.1	<0.1
TP104 0.1	TP104 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	2	<0.3	-	3.5	<0.5	2	-	<0.05	<0.5	-	-	2.5	-	-	-	-	-	-	6.6	-	<0.1	<0.1
TP105 0.1	TP105 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	3	<0.3	-	1.5	<0.5	2	-	<0.05	<0.5	-	-	<2	-	-	-	-	-	-	9.6	-	<0.1	<0.1
TP106 0.1	TP106 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	1	<0.3	-	0.9	<0.5	1	-	<0.05	<0.5	-	-	4.3	-	-	-	-	-	-	8	-	<0.1	<0.1
TP107 0.25	TP107 0.25	0.2-0.3	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<1	<0.3	-	2.3	<0.5	<1	-	<0.05	<0.5	-	-	<2	-	-	-	-	-	-	13	-	<0.1	<0.1
TP108 0.1	TP108 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<1	<0.3	-	0.5	0.8	<1	-	<0.05	<0.5	-	-	2.6	-	-	-	-	-	-	18	-	<0.1	<0.1
TP109 0.1	TP109 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	1	<0.3	-	1.4	<0.5	1	-	<0.05	<0.5	-	-	2.5	-	-	-	-	-	-	9.2	-	<0.1	<0.1
TP110 0.1	TP110 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	2	<0.3	-	1	0.5	2	-	<0.05	<0.5	-	-	3.2	-	-	-	-	-	-	13	-	<0.1	<0.1
TP201 0.1	TP201 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	3	<0.3	-	2.4	3.1	7	-	<0.05	1.2	-	-	69	-	-	-	-	-	-	7.8	-	<0.1	<0.1
TP202 0.1	TP202 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	4	<0.3	-	3.4	2.4	9	-	<0.05	<0.5	-	-	11	-	-	-	-	-	-	12	-	<0.1	<0.1
TP203 0.4-0.5	TP203 0.4-0.5	0.4-0.5	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	5	0.4	-	4.1	9.8	16	-	<0.05	1.1	-	-	150	-	-	-	-	-	-	11	-	<0.1	<0.1
TP204 0.1	TP204 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	3	<0.3	-	3.1	6.2	8	-	<0.05	1.1	-	-	25	-	-	-	-	-	-	13	-	<0.1	<0.1
TP205 0.1	TP205 0.1	0.09-0.11	24/08/2018			<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	2	<0.3	-	5.9	5.8	8	-	<0.05	1.8	-	-	58	-	-	-	-	-	-	17	-	<0.1	<0.1
Statistical Summary																																		
Number of Results						15	15	15	15	15	15	15	15	15	15	1	15	15	15	1	15	15	1	1	15	1	1	1	1	1	1	15	1	15	15
Number of Detects						0	0	0	0	0	0	0	0	12	1	1	15	7	13	1	0	4	1	1	12	1	1	1	1	1	1	15	1	0	0
Minimum Concentration						<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	<1	<0.3	68	0.5	<0.5	<1	24	<0.05	<0.5	23	8	<2	0.34	0.19	0.06	0.04	5.7	0.63	5.8	4.1	<0.1	<0.1
Minimum Detect						ND	ND	ND	ND	ND	ND	ND	ND	1	0.4	68	0.5	0.5	1	24	ND	1.1	23	8	2.4	0.34	0.19	0.06	0.04	5.7	0.63	5.8	4.1	ND	ND
Maximum Concentration						<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1	5	0.4	68	5.9	9.8	16	24	<0.05	1.8	23	8	150	0.34	0.19	0.06	0.04	5.7	0.63	18	4.1	<0.1	<0.1
Maximum Detect						ND	ND	ND	ND	ND	ND	ND	ND	5	0.4	68	5.9	9.8	16	24	ND	1.8	23	8	150	0.34	0.19	0.06	0.04	5.7	0.63	18	4.1	ND	ND
Average Concentration						0.05	0.05	0.05	0.05	0.05	0.4	0.05	0.05	2	0.17		2.5	2	4.3		0.025	0.53			22							11		0.05	0.05
Median Concentration						0.05	0.05	0.05	0.05	0.05	0.4	0.05	0.05	2	0.15	68	2.4	0.25	2	24	0.025	0.25	23	8	3	0.34	0.19	0.06	0.04	5.7	0.63	9.6	4.1	0.05	0.05
Standard Deviation						0	0	0	0	0	0	0	0	1.4	0.065		1.4	3	4.4		0	0.51			41							3.8		0	0
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

					Organochlorine Pesticides																							Organophosphorous Pesticides									
					a-BHC	Aldrin	b-BHC	Chlordane (cis)	gamma-Chlordane	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	o,p-DDD	o,p'-DDE	trans-Nonachlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Methidathion
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.5	0.5	0.2	0.2	0.2	0.5
CRCCARE 2011 Soil HSL for Direct Contact, HSL-A Residential 0-1m																																					
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - aged 0-2m												180																									
NEPM 2013 Sch B1 Table 7 Asbestos HSLs																																					
NEPM 2013 ESL UR/POS, Coarse Soil 0-2m																																					
NEPM 2013 ESL UR/POS, Fine Soil 0-2m																																					
NEPM 2013 HIL, Residential A																	10				6		10	300						160							
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Clay 0-1m																																					
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand 0-1m																																					
NEPM 2013 Management Limits, C/I, Coarse Soil																																					
NEPM 2013 Management Limits, C/I, Fine Soil																																					
Field_ID	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**	**Matrix_Description**																																	
TP101 0.1	TP101 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP102 0.1	TP102 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP103 0.1	TP103 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP104 0.1	TP104 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP105 0.1	TP105 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP106 0.1	TP106 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP107 0.25	TP107 0.25	0.2-0.3	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP108 0.1	TP108 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP109 0.1	TP109 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP110 0.1	TP110 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP201 0.1	TP201 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP202 0.1	TP202 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP203 0.4-0.5	TP203 0.4-0.5	0.4-0.5	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP204 0.1	TP204 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
TP205 0.1	TP205 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
Statistical Summary																																					
Number of Results					15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.5
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.25	0.25	0.25	0.1	0.1	0.1	0.25
Median Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.25	0.25	0.25	0.1	0.1	0.1	0.25
Standard Deviation					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

				Pesticides			Other	Polychlorinated Biphenyls									
				Isodrin	Mirex	Parathion	Estimated Fibres	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1268	Arodor 1262	PCBs (Sum of total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				0.1	0.1	0.2	100	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1
CRCCARE 2011 Soil HSL for Direct Contact, HSL-A Residential 0-1m																	
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - aged 0-2m																	
NEPM 2013 Sch B1 Table 7 Asbestos HSLs																	
NEPM 2013 ESL UR/POS, Coarse Soil 0-2m																	
NEPM 2013 ESL UR/POS, Fine Soil 0-2m																	
NEPM 2013 HIL, Residential A					10												1
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Clay 0-1m																	
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand 0-1m																	
NEPM 2013 Management Limits, C/I, Coarse Soil																	
NEPM 2013 Management Limits, C/I, Fine Soil																	
Field_ID	**Location_Code**	**Sample_Depth_Range**	**Sampled_Date_Time**	**Matrix_Description**													
TP101 0.1	TP101 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP102 0.1	TP102 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP103 0.1	TP103 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP104 0.1	TP104 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP105 0.1	TP105 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP106 0.1	TP106 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP107 0.25	TP107 0.25	0.2-0.3	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP108 0.1	TP108 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP109 0.1	TP109 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP110 0.1	TP110 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP201 0.1	TP201 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP202 0.1	TP202 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP203 0.4-0.5	TP203 0.4-0.5	0.4-0.5	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP204 0.1	TP204 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
TP205 0.1	TP205 0.1	0.09-0.11	24/08/2018		<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
Statistical Summary																	
Number of Results					15	15	15	7	15	15	15	15	15	15	15	15	15	15
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<0.1	<0.1	<0.2	<100	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration					0.05	0.05	0.1	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5
Median Concentration					0.05	0.05	0.1	50	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5
Standard Deviation					0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX

D

QA/QC REPORT

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Date: 24 September 2018

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QA/QC Report

Supplementary Contamination Assessment Report

Lot 173 DP 1212974 & Lot 212 DP 866437 Hue Hue Road & Bushells Ridge Road, Wyee

This Quality Assurance and Quality Control (QA/QC) report assesses the reliability of field procedures adopted and the analytical results produced as part of the Supplementary Contamination Assessment for Lot 173 DP 1212974 and Lot 212 DP 866437 ('the Site'). The following data quality indicators have been adopted with reference to the National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure, 1999 (amended, April 2013) (NEPM, 2013):

> Precision – The quantitative measure of variability of reproducibility of the data. Is a measure of the reproducibility of on measurements under a given set of conditions the Relative Percent Difference ('RPD') has been adopted to assess the precision of data between duplicate sample pairs;

> Accuracy – The quantitative measure of the closeness of the reported data to the true value. It is a measure of the bias in the analytical results and can often be attributed to: field contamination; insufficient preservation or sample preparation; or inappropriate analytical techniques. Accuracy of the analytical data is assessed by consideration of laboratory control samples, laboratory spikes and analytical techniques in accordance with appropriate standards. Accuracy of the fieldwork is assessed against an assessment of field blank, field trip and rinsate results;

> Representativeness – The confidence that the data is representative of each medium present on the site. Data representativeness is achieved by the collection of samples at an appropriate pattern and density as well as consistent and repeatable sampling techniques and procedures;

> Completeness – A measure of the amount of usable data (expressed as a %) from a data collection activity. Sufficient data is required to enable an assessment of the Decision Rules; and,

> Comparability – The confidence that data may be considered to be equivalent for each sampling and analytical event. This is achieved through consistent sampling and analytical testing and reporting techniques.

The data quality objectives, requirements and indicators for the assessment are presented in Table 1 below.

Table 1 Data Quality Objectives, Requirements and Indicators

Data Quality Objective	Requirement	Data Quality Indicator
Precision		
Intra-laboratory Duplicates	1 per 20 samples	RPDs < 50%
Inter-laboratory Duplicates	1 per 20 samples	RPDs < 50%
Laboratory Duplicates	Minimum of 1 per batch per analyte.	RPDs < 50%
Accuracy		
Laboratory Matrix Spikes	1 per batch per volatile/semi-volatile analyte	Recoveries 50% to 150%
Laboratory Surrogate Spikes	1 per volatile/semi-volatile analyte sample (as appropriate)	Recoveries 70% to 130%
Laboratory Method Blanks	At least 1 per batch per analyte tested	Result < Limit of reporting
Laboratory Control Samples	At least 1 per batch per analyte tested	Result < Limit of reporting
Rinsate samples	1 per sampling day	Result < Limit of reporting
Representativeness		
Sampling methodology	Appropriate for the sample type and analytes	Meet Requirement
Samples extracted and analysed within holding times	Specific to each analyte	Meet Requirement
Comparability		
Sampling approach	Consistent for each sample	Meet Requirement
Analysis methodology	Consistent methodology for each sample	Meet Requirement
Handling conditions and sampler	Consistent for each sample	Meet Requirement
Field observations and analytical results	Field observations to support analytical results	Meet Requirement
Consistent laboratory Limit of Reporting (LOR)	Consistent between primary and secondary laboratories	Meet Requirement
Completeness		
Chain of Custody Documentation	Appropriately completed	Meet Requirement
Field Sampling Documentation	Appropriately completed	Meet Requirement
Satisfactory quality assurance/ quality control procedures	In accordance with relevant guidance	Meet Requirement

1 Field QA/QC Results

1.1 Duplicate Sampling Techniques

1.1.1 Soil Sampling

Duplicate samples were collected by splitting soil samples in the field. This comprised collecting a sample of soil from the test pit and splitting it equally (per volume) into three laboratory supplied jars (primary, duplicate and triplicate). This process was repeated until all jars were full and zero headspace remained. Care was taken to collect a representative sample in each jar, that is, from the same strata, location and depth within the test pit.

Field splitting was employed rather than sample homogenisation (blending of a sample in a bowl) and splitting to minimise VOC loss.

1.2 Decontamination Procedures

Decontamination of non-disposable equipment was conducted between sampling events and comprised:

> The scrubbing of field equipment in contact with potentially contaminated materials with a scrubbing brush and a container of 1% Decon 90 solution; and,

> Rinsing of equipment with deionised water following scrubbing to remove the detergent.

1.3 Relative Percentage Difference

The precision or repeatability of laboratory results obtained between field split primary and replicate samples (ie. duplicate and triplicate samples) is derived by the calculation of the relative percentage differences (RPDs). The calculation of the RPD is conducted using the following equation:

$$\text{RPD (\%)} = \frac{\text{Original - Duplicate}}{\text{(Original + Duplicate) / 2}} \times 100$$

A RPD of +/- 50% is generally considered acceptable.

The comparative analysis between the primary and replicate samples for the sampling event is summarised below in Table 2. Note that when the laboratory result for one or both samples is below the PQL the RPD has been given as NA. Complete laboratory reports are provided in Appendix G.

Table 2 Replicate RDP results for TP107-0.25, TP205-0.1 and associated duplicates

Contaminant Species		PQL [1]	Primary Sample ID	Duplicate ID	RPD	Primary Sample ID	Duplicate ID	RPD
			TP107-0.25	DUP2		TP205-0.1	DUP1	
Metals	Arsenic	1	<1	<1	NA	2	3	40%
	Cadmium	0.3	<0.3	<0.3	NA	<0.3	<0.3	NA
	Chromium	0.3	2.8	2.3	20%	5.9	4	38%
	Copper	0.5	<0.5	<0.5	NA	5.8	6.2	7%
	Lead	1	2	<1	NA	8	9	12%
	Mercury	0.05	<0.05	<0.05	NA	<0.05	<0.05	NA
	Nickel	0.5	<0.5	<0.5	NA	1.8	1.9	5%
	Zinc	2	<2.0	<2.0	NA	58	60	3%
TRH	C_6 - C_9	20	<20	<20	NA	<20	<20	NA
	C_{10} - C_{36}	110	<110	<110	NA	<110	<110	NA
	F1 - C_6 - C_9	25	<25	<25	NA	<25	<25	NA
	F2 > C_{10} - C_{16}	25	<25	<25	NA	<25	<25	NA
	F3 > C_{16} - C_{34}	90	<90	<90	NA	<90	<90	NA
	F4 > C_{34} - C_{40}	120	<120	<120	NA	<120	<120	NA
	Naphthalene	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
BTEX	Benzene	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Ethylbenzene	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Toluene	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Xylene Total	0.3	<0.3	<0.3	NA	<0.3	<0.3	NA
PAH	Total	0.8	<0.8	<0.8	NA	<0.8	<0.8	NA
	B(a)P	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	B(a)P TEQ (Upper)	0.3	<0.3	<0.3	NA	<0.3	<0.3	NA
OCP	Total	1.0	<1	<1	NA	<1	<1	NA
	DDT+DDE+DDD	0.3	<0.3	<0.3	NA	<0.3	<0.3	NA
	DDT	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Aldrin + Dieldrin	0.3	<0.3	<0.3	NA	<0.3	<0.3	NA
	Chlordane	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Endosulfan	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Endrin	0.2	<0.2	<0.2	NA	<0.2	<0.2	NA
	Heptachlor	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
	Methoxychlor	0.1	<0.1	<0.1	NA	<0.1	<0.1	NA
OPP	Total	1.7	<1.7	<1.7	NA	<1.7	<1.7	NA
	Chlorpyrifos	0.2	<0.2	<0.2	NA	<0.2	<0.2	NA
PCB	Total	1.0	<1	<1	NA	<1	<1	NA

Notes to Table F5:

Bold - indicates exceedance of the acceptable RPD range of +/- 30% for inorganic analytes and +/- 50% for organic analytes

1 - SGS PQL Values

The replicate RPD results summarised in Table 2 indicate that the samples analysed were generally within the acceptable RPD range of +/- 50%.

The RPD results indicate the sampling methodology was acceptable and laboratory precision or repeatability was achieved.

1.4 Rinsate Samples

Rinsate samples are samples of laboratory prepared water poured over or through decontaminated field sampling equipment prior to the collection of environmental samples. Following completion of decontamination procedures (refer Section 1.2) laboratory supplied de-ionised water was poured over sampling equipment (typically a stainless steel garden trowel) and collected into a clean sampling jar for contaminant analysis. Rinsate samples are recovered to determine the adequacy of decontamination procedures and the potential for cross contamination of samples through use of adulterated sampling equipment.

Laboratory results for the Total Heavy Metals analysis of rinsate samples for the investigation are summarised in Table 3. Complete laboratory reports sheets are provided in Appendix G.

Table 3 Summary of TRH/BTEX Rinsate laboratory results

Sample ID	Date Sampled	BTEX						TRH	
		Benzene	Toluene	Ethyl-benzene	o-Xylene	m+p-Xylene	Total Xylenes	C_6 - C_9	C_{10} - C_{36}
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RIN 24.08.2018	24/08/2018	<0.5	<0.5	<0.5	<0.5	<1	<1.5	<40	<450
SGS PQL		0.5	0.5	0.5	0.5	1	3	40	450

Notes to Table:

BOLD - Indicates laboratory result is greater than the laboratory PQL

PQL - Practical Quantification Limit

The rinsate laboratory results summarised in Table 3 were all less than the laboratory PQL, indicating that field decontamination procedures were generally adequate.

2 Laboratory QA/QC Results

The following laboratory QA/QC reports met all Data Quality Objectives:

- SE183217
- SE183218

The following laboratory QA/QC reports did not meet all Data Quality Objectives:

- SE183216 (extraction date)

The rinsate sample (RIN 24.08.2018) required to be extracted by the 29th August, 2018. It was not extracted until the 3rd September, 2018. These times are recommendations only and as samples were refrigerated/chilled adequately at all stages between sampling and analysis this non-compliance is not considered significant.

2.1 Laboratory Replicates

Laboratory replicates are generated by subjecting a separate aliquot of sample through the same preparation and analysis procedures as the primary sample. Comparison of the primary sample to the duplicate will yield a precision measurement (expressed as RPD) in a given matrix.

The laboratory acceptance criteria for duplicate samples are as follows:

> If results are less than 5 times the PQL, any RPD is acceptable; and,

> If results are greater than 5 times the PQL, an RPD of 0-50% is acceptable.

All samples from reports SE183216, SE183217 and SE183218 returned RPD values within the acceptance criteria.

2.2 Method Blanks

A Method Blank is an analyte free matrix (laboratory certified clean sands for solid samples or de-ionised water for water samples) which is subjected to the complete preparation and analytical procedure to assess contamination introduced during laboratory procedures.

All laboratory results for method blank analysis were below the PQL indicating laboratory procedures were adequate to prevent cross contamination of samples.

2.3 Matrix Spikes

The Matrix Spike is a separate aliquot of the sample spiked with known concentrations of the analytes of interest. It is analyzed to determine, including the matrix interferences, if the procedure is working within established control limits. Analyte recoveries must lie between 70-130% for inorganics, 60-140% for organics and 10-140% for SVOC and Phenols.

All laboratory results for matrix spike analysis were within the acceptance criteria.

3 Summary

It was considered that the field and laboratory QA/QC criteria were generally within acceptable limits indicating field sampling, storage, handling and decontamination procedures and laboratory preparation and analysis procedures were adequate for the purposes of the environmental investigation.