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Report on
Limited Contamination Assessment

New High School in Jerrabomberra
Part Lot 1 DP 1263364, Jerrabomberra

Prepared for
NSW Department of Education - School Infrastructure
NSW

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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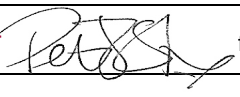
Reviewer		for Dean Woods	7 September 2021

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Executive Summary

The objective of the Limited Contamination Assessment (LCA) was to identify potential sources of contamination and determine the potential contaminants of concern, identify areas of potential contamination, identify human and ecological receptors associated with the proposed development and identify potentially affected media (soil, groundwater, ground gas etc.). The LCA was also undertaken to provide preliminary advice on a waste classification/ Virgin Excavated Natural Material (VENM) assessment.

The LCA included the following scope of works:

- Undertake a limited subsurface investigation including the drilling of 14 boreholes (locations were nominated by the client) with sampling and laboratory testing for the contaminants of concern as outlined in Sections 9 and 10;
- Revision of the conceptual site model (CSM) based on the results of the limited subsurface investigation and laboratory testing; and
- Preparation of this report presenting the findings of the LCA, identification of potential sources of contamination, and an assessment of the need for further investigations and/or management.

Potential sources and areas of contamination were identified on the basis of the available site information, site walkover and soil chemical analysis. Based on the findings of the investigation, it is considered that the likelihood of gross chemical contamination to be present on the site is low.

All soil results for TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the laboratory's practical quantitation limit (PQL). All soil results for metals were above the PQL but below the SAC with the exception of arsenic in samples discussed in Section 12, and soil results for all cadmium and mercury results, which were all below the PQL.

The results of the soil contaminant testing were also compared to NSW waste classification criteria in order to provide a preliminary waste classification for the material that is understood to be excavated and disposed off-site during construction. Concentrations of metals, TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the CT1 criteria for General Solid Waste (non-putrescible). Therefore, the material will likely be classified as General Solid Waste (non-putrescible).

Based on the natural material observed from the boreholes and chemical analysis of select samples, the material could also be classified as VENM. It should be noted that a VENM classification would be no longer be acceptable should the VENM be mixed with any fill or other potential contaminants (i.e. mixed with the stockpile located within the site).

Based on the assessment findings, it is considered that the site can be rendered suitable for the proposed school, subject to the following recommended investigations being undertaken, including:

- Should the stockpile remain within the proposed school site, an intrusive investigation should be undertaken to delineate the extent and quality of the stockpile.

DP also recommends that the following measures are undertaken at the site during any future development works:

- A Construction Environment Management Plan (CEMP) should also be prepared including an 'unexpected finds protocol' and implemented during the works (i.e. hydrocarbon staining and/odours observed during works);

- An asbestos finds protocol should be prepared and implemented during construction work (to be included in the CEMP);
- Should suspected asbestos be encountered at the site, the affected area should be fenced off and assessed by an NSW licensed asbestos assessor; and
- Should any fill material (i.e. the stockpile located on site) be required to be disposed off-site, the material must be assessed in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014) and assigned a waste classification prior to off-site disposal.

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Report on Limited Contamination Assessment
New High School in Jerrabomberra
Part Lot 1 DP 1263364, Jerrabomberra

1. Introduction

This Limited Contamination Assessment accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of an application for a State Significant Development (SSD No 24461956). The SSDA is for a new high school located at Jerrabomberra.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably:

SEARs Requirement	Response
19. Contamination	
Assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable for the proposed use in accordance with SEPP 55. This must include the following prepared by certified consultants recognised by the NSW Environment Protection Authority.	Limited Contamination Assessment and recommendations for further site investigations, if required. The following key guidelines were consulted in the preparation of this report: • NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); • NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); • NSW Department of Urban Affairs and Planning, Managing Land Contamination Planning Guidelines SEPP 55–Remediation of Land, 1998; and • NSW EPA's *Sampling Design Guidelines* (NSW EPA, 1995).

2. Proposal

The proposed development is for the construction of a new high school in Jerrabomberra. The proposal will meet community demand and to ensure new learning facilities are co-located near existing open space infrastructure. The proposal generally includes the following works:

- Site preparation;

- Construction of a series of buildings up to three storeys including administration/staff areas, library, hall and general learning spaces;
- Construction of new walkways, central plaza and outdoor games courts;
- Construction of a new at-grade car park; and
- Associated site landscaping and open space.

The proposal has been designed to accommodate approximately 500 students with Stream 3 teaching spaces, however the core facilities will be future proofed to a Stream 5 to enable possible future expansion to meet projected demand.

The proposal will include site preparation works, such as clearing and levelling to accommodate the proposed buildings and play areas. The proposal will involve the construction of a series of buildings housing general learning spaces, administration and staff wings, outdoor learning areas, a library and assembly hall.

The proposal will include construction of a new driveway and hardstand with access proposed off the northern stub road east of Environa Drive. Pedestrian access is proposed off Environa Drive and the northern stub road.

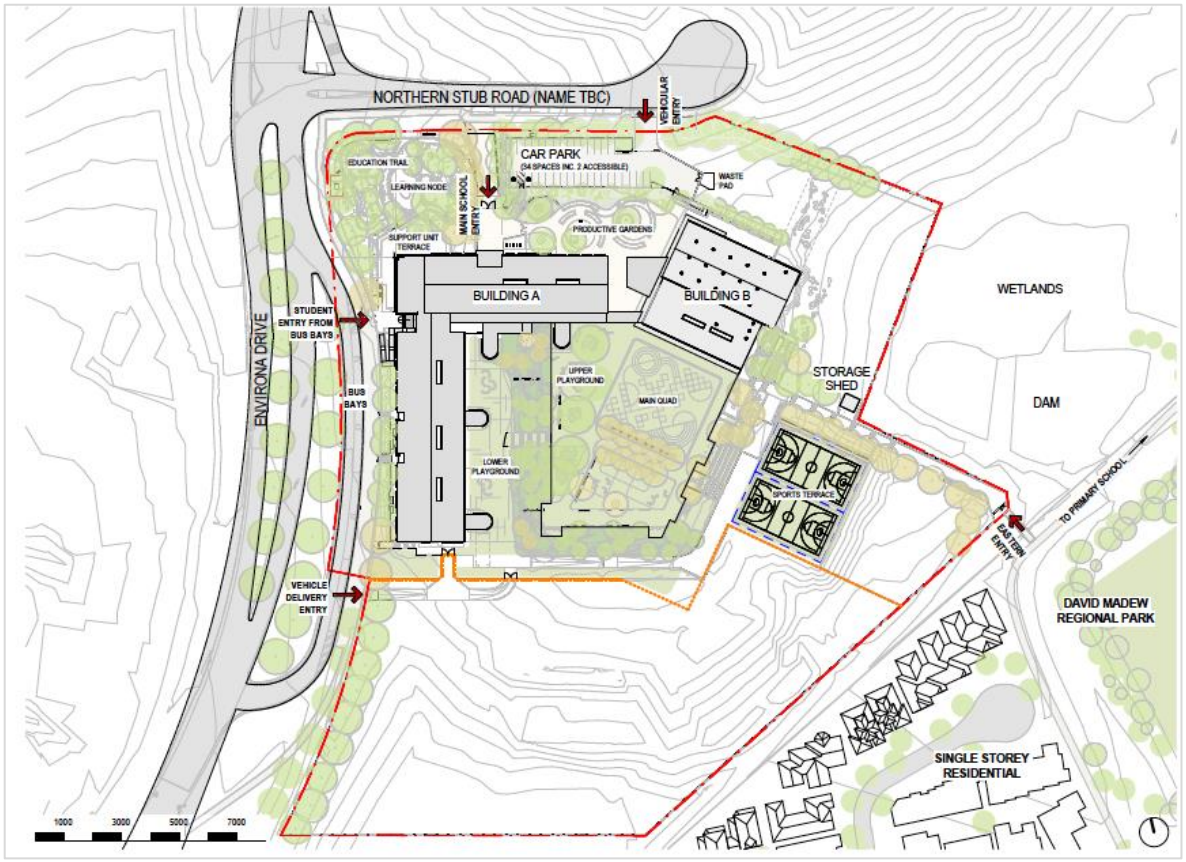

Figure 1: Proposed site plan
Source: TKD Architects

3. Site Description

The proposed development is located within the South Jerrabomberra Innovation Precinct, also referred as the Poplars Innovation Hub, in the local government area of Queanbeyan-Palerang Regional Council. The school site- is part of an existing lot (Lot 1 in DP 1263364), which is approximately 65.49ha in area and will be characterised by a mix of business park and open space uses and a new north-south connector road named Environa Drive.

Delivery of the Precinct is underway with Environa Drive currently under construction. Most of the-lot, however, remains undeveloped.

The school site is subject to a proposed lot (Lot 2 in DP 1263364), which was approved by Council under DA332-2015 on 10 March 2021 but is not yet registered. The approved lot is irregular in shape, is largely cleared and is approximately 4.5ha in area. A small dam is located adjacent to the south eastern boundary of the site, which forms part of a broader wetland.

The site is located in excellent proximity to existing open space facilities. It adjoins David Madew Regional Park to the south east and is located 100m east of an existing recreational field associated with Jerrabomberra Public School.

A description of the site is provided in the table below.

Table 1: New High School in Jerrabomberra Site Description

Item	Description
Site address	School address yet to be determined however, it is located within the Jerrabomberra Innovation Precinct at 300 Lanyon Drive, Jerrabomberra.
Legal description	Lot 1 in DP 1263364 (existing) Lot 2 in DP 1263364 (proposed, but not registered)
Total area	Lot 1 – 65.49ha Lot 2 – 4.5ha
Frontages	The site provides frontage to Environa Drive and the northern stub road, both currently under construction.
Existing use	The site is undeveloped and contains a series of small vegetation clusters scattered across the site.
Existing access	Existing access is via an informal unsealed driveway off Tompsitt Drive along the northern boundary of the existing lot. The site will be accessed via Environa Drive and a secondary access road (North Road), which is currently under construction.
Context	Land to the south is primarily residential in nature. Jerrabomberra Public School and David Madew Regional Park are located to the east/south-east, while land to the west is undeveloped and features Jerrabomberra Creek. The site is located within the South Jerrabomberra Innovation Precinct, which is currently under construction. The areas north and west of the site are currently undeveloped but the site is currently undergoing a transition from rural to business park uses. Development further north on the opposite side of Tompsitt Drive and along Edwin Land Parkway includes retail and commercial uses. Development immediately to the south includes existing low density residential development. Land in the south west has been identified for future low density residential, light industrial and business park uses.

Figure 2: Site aerial depicting the land subject to the proposed High School.
Source: TKD Architects

4. General

The objective of the LCA was to identify potential sources of contamination and determine the potential contaminants of concern, identify areas of potential contamination, identify human and ecological receptors associated with the proposed development and identify potentially affected media (soil, groundwater, ground gas etc.). The LCA was also undertaken to provide preliminary advice on a waste classification/VENM assessment. The site is shown on Drawing 1, Appendix A. and the investigation was undertaken in accordance with DP's proposal CAN200440 dated 18 December 2020 and email variation proposal dated 5 March 2021. It should be noted that the information contained in Sections 1 – 3 of this report has been provided by the client as a preamble and DP has been required to reproduce these paragraphs in this report.

DP has also undertaken a geotechnical investigation concurrently with this contamination investigation, which has been reported separately.

This report must be read in conjunction with all appendices including the notes provided in Appendix B.

5. Scope of Work

The following scope of works was undertaken to meet the project objectives:

- Undertake a limited subsurface investigation including the drilling of 14 boreholes (locations were nominated by the client) with sampling and laboratory testing for the contaminants of concern as outlined in Sections 9 and 10 (it should be noted, at the time of the investigation, the stockpile identified on site was not subject to sampling as it is not known whether it will remain or site or be used for the North Entry Road construction site, where the stockpile originated from);
- Revision of the conceptual site model (CSM) based on the results of the limited subsurface investigation and laboratory testing; and
- Preparation of this report presenting the findings of the LCA, identification of potential sources of contamination, and an assessment of the need for further investigations and/or management.

6. Environmental Setting

Regional Topography	Undulating low hills with gently to moderately inclined hillslopes with an overall regional slope from the north-east to the south-west with elevations ranging from 650 m to 950 m Australian Height Datum (AHD).
Site Topography	The site forms the top of a small hill/ridgeline and generally slopes in all directions with surface levels ranging from approximately 605 m to 592 m.
Soil Landscape	Reference to the 1:100 000 'Canberra Soil Landscape' Series Sheet 8727 indicated that the site is mapped as being on the Burra Soil Group. The Burra Soil Group is characterised by undulating to rolling low hills and alluvial fans on Silurian Volcanics. Soils are shallow, well drained Rudosol and Tenosols on crests and upper slopes, moderately deep, moderately well-drained Red Kurosols and Red Kandosols on mid-slopes and most lower slopes and moderately deep, slowly to moderately well-drained Brown Chromosols and Brown Kandosols along minor drainage lines and on some lower slopes. This soil group is limited by its strongly acid soils with low fertility and low available waterholding capacity. Subsoils have low permeability and there is a moderate mass movement hazard and sheet erosion risk.
Geology	Reference to the Canberra 1:100 000 Geological Series Sheet indicates the site is predominantly underlain by the Deakin Volcanics of Late Silurian age. The Deakin Volcanics typically comprise rhyodacitic ignimbrite with minor volcaniclastic and argillaceous sedimentary rocks. The southern and eastern boundaries of the site are mapped as being underlain by alluvium of Quaternary age which typically comprises of

	gravel, sand, silty clay and black organic clay. It is likely that the alluvium is underlain by rocks of the Deakin Volcanics.
Acid Sulfate Soils	Reference to the CSIRO's Atlas of Australian Acid Sulfate Soils online mapping portal, (A S R I S - Atlas of Australian Acid Sulfate Soils (csiro.au)) indicates that the site has an extremely low probability of acid sulfate soils to be present.
Surface Water	A sediment quality control pond is located within the southern area of the site. An unnamed tributary flows from along the eastern and southern boundaries of the site in a north to south direction and then south to north direction, respectively. The tributary then flows into Jerrabomberra Creek approximately 150 m to the west of the site.
Groundwater	The 1:100,000 map 'Hydrogeology of the Australian Capital Territory and Environs' indicates that the site is underlain by geological units of late Silurian aged. These typically include: dacitic and rhyodacitic ignimbrite, bedded tuffs, minor shale, sandstone, limestone and ashstone and are typically fractured, high yielding where minor limestone beds, major fold closures, major geologic contacts, individual ash-flows and interbedded sediments appear. Groundwater quality tends to be variable. The likely yield of the groundwater aquifer is indicated to be less than 0.5 L/s with total dissolved solids greater than 1000 mg/L. Anticipated groundwater flow direction is inferred to be towards the Jerrabomberra Creek to the south-west. A search of the publicly available registered groundwater bore database indicated that there are two registered groundwater bores within 1 km of the site. They are listed below: • GW402607 Domestic Bore: 500 m north-east of the site: depth of 90 m, standing water level of 7.0 m and a yield of 0.438 L/s; and • GW025629 Stock / Domestic Bore: 920 m north of the site, depth of 23.2 m, standing water level and yield are unknown.

7. Previous Reports

The following previous report is relevant to the current investigation:

- Preliminary Site Investigation for a proposed Jerrabomberra High School, (DP, 2021).

A PSI for the site was undertaken in April 2021 by DP. The historical aerial photographs indicated that the site has remained to be undeveloped open land. It was considered likely that the site may have been used for grazing. The 2020 Aerial Photograph indicated that the western and northern boundaries of the site had been disturbed as part of the NER construction site. The photograph also indicated ground disturbance associated with a trench excavation, an unsealed access road and stockpile placement within the southern area of the site had occurred. During the site walkover, stockpiles were observed within the south-eastern area of the site. The fill comprised of weathered rhyodacite and

residual clays. Historical aerial photographs indicate that the fill placement may have been contemporaneous with the construction of the NER.

Based on the assessment findings, it was considered that the site can be rendered suitable for the proposed school, subject to the following recommended investigations being undertaken, including:

- Should the stockpile remain on site and developments are to occur within the stockpile area, an intrusive investigation to delineate the extent and quality of the stockpile on site; and
- An intrusive investigation should be undertaken across the site where excavations are likely to occur which will provide preliminary waste classification and / or VENM advice.

DP also recommended that the following measures are undertaken at the site during any future development works:

- A Construction Environment Management Plan (CEMP) should also be prepared including an 'unexpected finds protocol' and implemented during the works (i.e. hydrocarbon staining and/odours observed during works);
- An asbestos finds protocol should be prepared and implemented during construction work (to be included in the CEMP);
- Should suspected asbestos be encountered at the site, the affected area should be fenced off and assessed by an NSW licensed asbestos assessor; and
- Should any fill material be required to be disposed off-site, the material must be assessed in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014) and assigned a waste classification prior to off-site disposal.

8. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Potential Sources

Based on the current investigation, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified.

- S1: Fill: Associated with spoil located within the southern area of the site and possible dumping due to past agricultural land use.
  - COPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), phenols and asbestos.
- S2: Past agricultural pesticide practices.
  - COPC include lead, TRH, BTEX, PAH, and volatile organic compounds (VOC).

Potential Receptors

The following potential human receptors have been identified:

- R1: Current users [vacant land/agricultural];
- R2: Construction and maintenance workers;
- R3: End users [High school – students and staff]; and
- R4: Adjacent site users [Construction site, vacant land, recreational land and residential].

The following potential environmental receptors have been identified:

- R5: Surface water [unnamed tributary and Jerrabomberra Creek – freshwater];
- R6: Groundwater; and
- R7: Terrestrial ecology.

Potential Pathways

The following potential pathways have been identified:

- P1: Ingestion and dermal contact;
- P2: Inhalation of dust and/or vapours;
- P3: Surface water run-off;
- P4: Lateral migration of groundwater providing base flow to water bodies;
- P5: Leaching of contaminants and vertical migration into groundwater; and
- P6: Contact with terrestrial ecology.

Summary of Potentially Complete Exposure Pathways

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S2) and receptors (R1 to R7) are provided in Table 2.

Table 2: Summary of Potentially Complete Exposure Pathways

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S1: Fill, Metals, TRH, BTEX, PAH, OPP, OCP, PCB, phenols and asbestos	P1 and P2	R1, R2 and R3	Fill was present in the form of a stockpile within the southern area of the site. Preliminary plans indicate that the school will be constructed to the west of the stockpile. It is unknown whether this material will stay on site or be reused on the NER construction site.
	P2	R4	
	P3 and P5	R5	
	P4	R6	
	P6	R7	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
			If the stockpile is to remain within the boundaries of the proposed school site, an intrusive investigation is recommended to assess possible contamination including testing of the soils.
S2: Past use of pesticides, Metals, OPP and OCP	P1, P2 and P3	R1, R2, R3 and R4	Potential past agricultural pesticide practices may have occurred on site. An intrusive investigation is recommended to assess possible contamination including testing of the soils and groundwater.
	P3, P4 and P5	R4	
	P3 and P4	R5	
	P4 and P5	R6	
	P6	R7	

9. Sampling and Analysis Quality Plan

9.1 Data Quality Objectives

The LCA was devised with reference to the seven-step data quality objective process which is provided in Appendix B Schedule B2, NEPC (2013). The DQO process is outlined in Appendix C.

9.2 Soil Sampling Rationale

The client provided the borehole location plan. It was assumed that the locations were based on where the development of the site is proposed to occur (i.e. building locations, car parks and oval). The stockpile area did not appear to have any proposed developments within that area and therefore the stockpiles were not sampled. It should also be noted that the stockpile identified on site was not subject to sampling as it is not known whether it will remain or site or be used for the North Entry Road construction site, where the stockpile originated from.

Soil samples were collected from each borehole at depths of approximately 0.1 m, 0.5 m, 1.0 m and every 1.0 m thereafter, and changes in lithology or signs of contamination.

The general sampling methods are described in the field work methodology, included in Appendix D.

10. Site Assessment Criteria

The site assessment criteria (SAC) applied in the current investigation are informed by the CSM (Section 8) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic public open space (high school) land use scenario. NSW waste classification criteria (WCC) has also been included. The derivation of the SAC and WCC are included in Appendix E and the adopted SAC and WCC are listed on the summary analytical results tables in Appendix H.

11. Results

11.1 Field Work Results

The borehole logs for this assessment are included in Appendix F. The logs recorded the following general sub-surface profile:

- **TOPSOIL:** generally low plasticity clay with a various mixture of sand and silt in all boreholes to depths of 0.1 m – 0.35 m; overlying
- **COLLUVIUM / RESIDUAL:** generally low to medium plasticity clayey soils and medium dense to very dense sandy soils in Bores 1 – 6 and 8, from 0.1 m – 0.2 m depths to 0.3 m – 3.2 m depths;
- **EXTREMELY WEATHERED RHYODACITE:** generally medium dense to very dense sandy soils with a various mixture of clay, silt and gravel in all the boreholes except Bores 4 and 14 from 0.15 m – 3.2 m depths to 0.3 m – 5.65 m depths;
- **RHYODACITE:** variably extremely low to extremely high strength, extremely/highly weathered to fresh rhyodacitic ignimbrite in all boreholes from 0.3 m – 5.65 m depths to the limit of investigation depths of 6.0 m – 7.0 m.

There were no other apparent records of visual or olfactory evidence (eg: staining, odours, free phase product) to suggest the presence of contamination within the soils or groundwater observed in the investigation.

The PID screening indicated that the sub-surface conditions were generally absent of VOC with all recorded values of less than 1 ppm.

No free groundwater was encountered during the drilling and coring of the boreholes. However, groundwater levels of 2.5 m – 5.7 m were observed in Bores 1, 3 - 5, 7 - 9 and 12 – 14, 24 hours after the boreholes were drilled. It is believed that due to the site being located on part of a ridgeline and elevated above the adjacent waterways, the groundwater that was observed was remnant driller's mud.

This, however, does not omit the potential for groundwater being located on site. Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature

and soil permeability. For these reasons, it is noted that the moisture condition of the site soils may vary considerably from the time of the investigation compared to at the time of construction. It must be noted that due to the topography, sandy nature of the site soils and fractured weathered rock, groundwater seepages must be expected following periods of rainfall.

11.2 Laboratory Analytical Results

The results of laboratory analysis are summarised in the following tables in Appendix H:

- Tables H1 and H2: Summary of Results of Soil Analysis;
- Table H3: Summary of Preliminary Waste Classification Assessment; and
- Tables QA1 – QA4: Quality Assurance and Quality Control.

The laboratory certificate(s) of analysis together with the chain of custody and sample receipt information are provided in Appendix G.

12. Discussion

12.1 Soils

Analytical results of soil samples were all within the adopted health-based (i.e. HIL-C / HSL-C), ecological (i.e. EIL / ESL) criteria, and management limits for urban open space (high school) land use.

All soil results for TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the laboratory's practical quantitation limit (PQL). All soil results for metals were above the PQL but below the SAC with the exception of arsenic in samples BH01 / 0.1 m, BH04 / 0.1 m, BH06 / 1.0 m, BH09 / 0.5 m, BH13 / 0.5 m and BH14 / 1.0 m and soil results for all cadmium and mercury results, which were all below the PQL.

Reported concentrations of metals, TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the CT1 criteria for General Solid Waste (non-putrescible). Based on the natural material observed from the boreholes and chemical analysis of select samples, the material could also be classified as VENM. It should be noted that a VENM classification would be voided should the natural material be mixed with any fill or potential contaminants (i.e. mixed with the stockpile located within the site).

12.2 Data Quality Assurance and Quality Control

The data quality assurance and quality control (QA/QC) results are included in Appendix I and the relative percentage difference results for intra-laboratory replicates are included in Appendix H. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

13. Revised Conceptual Site Model

The data collected for this LCA has generally confirmed that certain potential contaminant sources outlined in the CSM outlined in Section 8 pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing results. This is summarised in Table 3.

Table 3: Updated Summary of Potentially Complete Exposure Pathways (Proposed Land Use)

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S1: Fill, Metals, TRH, BTEX, PAH, OPP, OCP, PCB, phenols and asbestos	P1 and P2	R1, R2 and R3	The results of the intrusive investigation did not encounter fill across the site. The fill associated with the stockpile on site was not analysed as it was not in an area of proposed works and the client did not indicate that they needed test locations placed within the stockpile. The results of the laboratory analysis indicated that reported concentrations of contaminants of concern were below the adopted assessment criteria. It is considered that the potential for chemical contamination associated with fill at the site is low, however, a construction environmental management plan (CEMP) is recommended to be prepared and implemented during potential future site works, including an 'unexpected finds protocol' (UFP) and asbestos finds protocol to address any potential contaminants of concern associated with fill.. In addition, should fill material require disposal off-site or if the stockpiled fill present is to be used on-site or disposed off-site, further assessment would be required.
	P2	R4	
	P3 and P5	R5	
	P4	R6	
	P6	R7	

Source and COPC	Transport Pathway	Receptor	Risk Management Action
S2: Past use of pesticides, Metals, OPP and OCP	P1, P2 and P3	R1, R2, R3 and R4	The results of the laboratory analysis indicated that reported concentrations of contaminants of concern (metals and pesticides) were below the adopted assessment criteria. It is considered that the potential for chemical contamination associated with fill at the site is low, however, a construction environmental management plan (CEMP) is recommended to be prepared and implemented during potential future site works, including an 'unexpected finds protocol' (UFP) and asbestos finds protocol to address any potential contaminants of concern associated with pesticide use.
	P3, P4 and P5	R4	
	P3 and P4	R5	
	P4 and P5	R6	
	P6	R7	

14. Conclusions and Recommendations

Potential sources and areas of contamination were identified on the basis of the available site information, site walkover and soil chemical analysis. Based on the findings of the investigation, it is considered that the likelihood of gross chemical contamination to be present on the site is low.

All soil results for TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the laboratory's practical quantitation limit (PQL). All soil results for metals were above the PQL but below the SAC with the exception of arsenic in samples discussed in Section 12, and soil results for all cadmium and mercury results, which were all below the PQL.

The results of the soil contaminant testing were also compared to NSW waste classification criteria in order to provide a preliminary waste classification for the material that is understood to be excavated and disposed off-site during construction. Concentrations of metals, TRH, BTEX, PAH, OCP, OPP, PCB and phenols were below the CT1 criteria for General Solid Waste (non-putrescible). Therefore, the material will likely be classified as General Solid Waste (non-putrescible).

Based on the natural material observed from the boreholes and chemical analysis of select samples, the material could also be classified as VENM. It should be noted that a VENM classification would be no longer be acceptable should the VENM be mixed with any fill or other potential contaminants (i.e. mixed with the stockpile located within the site).
Based on the assessment findings, it is considered that the site can be rendered suitable for the proposed school, subject to the following recommended investigations being undertaken, including:

- Should the stockpile remain within the proposed school site, an intrusive investigation should be undertaken to delineate the extent and quality of the stockpile.

DP also recommends that the following measures are undertaken at the site during any future development works:

- A Construction Environment Management Plan (CEMP) should also be prepared including an 'unexpected finds protocol' and implemented during the works (i.e. hydrocarbon staining and/odours observed during works);
- An asbestos finds protocol should be prepared and implemented during construction work (to be included in the CEMP);
- Should suspected asbestos be encountered at the site, the affected area should be fenced off and assessed by an NSW licensed asbestos assessor; and
- Should any fill material (i.e. the stockpile located on site) be required to be disposed off-site, the material must be assessed in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014) and assigned a waste classification prior to off-site disposal.

15. References

Bureau of Mineral Resources (1992), *Geology of Canberra Geological Series Sheet 8727, 1:100 000 scale map*, dated 1992.

Bureau of Mineral Resources, Geology and Geophysics (1984) *Hydrogeology of the Australian Capital Territory and Environs 1:100,000 scale map*, dated 1984.

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene.* Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (1995). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

16. Limitations

Douglas Partners (DP) has prepared this report for this project at Jerrabomberra in accordance with DP's proposal CAN200440 dated 11 March 2021 and acceptance received from Schools Infrastructure New South Wales (SINSW) dated 24 February 2021. The work was carried out under contract ID SINSW01327/20, dated 3 March 2021. This report is provided for the exclusive use of SINSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

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Appendix A

Drawing 1

North Entry Road Construction Site

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Stripped Surface

Dam

Locality Plan

LEGEND

- Approximate Site Boundary
- Approximate Access Track Location
- Approximate Trench Excavation Location
- Approximate Sediment Quality Control Pond Location
- Approximate Stockpile Location
- Approximate Borehole Location

0 12.5 25 37.5 50 62.5

1:1250 @ A3

NOTE: Base drawing from nearmap.com.au, dated 13 April 2020)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: School Infrastructure NSW		
OFFICE: Canberra	DRAWN BY: SDG	
SCALE: As Shown	DATE: 16.09.2021	

TITLE: **Test Location Plan**
Proposed Jerrabomberra High School
Part Lot 1 DP 1263364, Jerrabomberra

N

PROJECT No: 94188.02
DRAWING No: R.002.D.001
REVISION: 3

Appendix B

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix C

Data Quality Objectives

Appendix C
Data Quality Objectives
Part Lot 1 DP 1263364, Jerrabomberra

C1.0 Data Quality Objectives

The limited contamination assessment has been devised broadly in accordance with the seven-step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

Step	Summary
1: State the problem	The objective of the investigation is to confirm the contamination status of the site with respect to the proposed land use. The report is being undertaken as the land is to be developed. The requirements of the regulator, Queanbeyan-Palerang Regional Council Council, will also be considered by consulting their Development Control Plan (DCP), Local Environment Plan (LEP) and any other requirements based on our recent experience with Council on similar sites. The DQO is to ensure that sufficient data (samples and analysis) are collected to assess the risks to human health and the environment. The project team consists of suitably qualified contaminated land consultants with reference to NEPC (2013) Schedule B9 and includes expert advice, if and where required. A CSM has been prepared (Section 8) for the proposed development.
2: Identify the decisions / goal of the study	The site history has identified possible contaminating previous uses which are identified in the CSM (Section 8). The CSM identifies the associated contaminants of potential concern (COPC) and the likely impacted media. The site assessment criteria (SAC) for each of the COPC are detailed in Section 10. e decision is to establish whether or not the results fall below the SAC. On this basis, an assessment of the site's suitability from a contamination perspective and whether (or not) further assessment and / or remediation will be derived.
3: Identify the information inputs	The DQO is to collect soil samples to measure the concentration of identified potential contaminants at the site using NATA accredited laboratories and methods, where possible.
4: Define the study boundaries	The lateral boundaries of the investigation area are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment and site observations. The assessment is limited to the timeframe over which the field investigation was undertaken. .
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with SAC (Section 10), based on NEPC (2013)). Where guideline values are absent, other sources of guideline values accepted by NEPC (2013) shall be adopted where possible. Where a sample result exceeds the adopted criterion, a further site-specific assessment will be made as to the risk posed by the presence of that contaminant(s).

Step	Summary
	Initial comparisons will be with individual results then, where required, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL) to assess potential risks posed by the site contamination. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPDs should generally be below 30%; for field blanks and rinsates, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Appendix G.
6: Specify the performance or acceptance criteria	The site assessment criteria was developed through reference to NEPC (2013) and for the current and anticipated future land use scenario (high school). The acceptance limits for laboratory QA/QC parameters were based on the laboratory reported acceptance limits and those stated in NEPC (2013).
7: Optimise the design for obtaining data	As the purpose of the sampling program is to assess for potential contamination across the site, the sampling program is reliant on professional judgement to identify and sample the potentially affected areas. Further details regarding the proposed sampling plan are presented in Section 9.

C2.0 References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

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Appendix D

Field Work Methodology

Appendix D
Field Work Methodology
Part Lot 1 DP 1263364, Jerrabomberra

D1.0 Guidelines

The following key guidelines were consulted for the field work methodology:

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

D2.0 Soil Sampling

Soil sampling is carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures comprise:

- Collect soil samples directly from the excavator bucket and solid flight auger blades at the nominated sample depth;
- Transfer samples in laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for PID screening;
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Collect 10% replicate samples for QC purposes;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

D2.1 Field Testing

Field testing is carried out in accordance with DP standard operating procedures. The general sampling and sample management procedures comprise:

PID Field Test

- Calibrate the PID with isobutylene gas at 100 ppm and with fresh air prior to commencement of each successive day's field work;
- Allow the headspace in the PID zip-lock bag samples to equilibrate; and
- Screen using the PID.

D3.0 References

ASTM D7663-12. (2018). *Standard Practice for Active Soil Gas Sampling in the Vadose Zone for Vapour Intrusion Evaluations.* 2018 e1 (editorial change to 2012 revision): American Society for Testing and Materials.

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP).* Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (2020). *Assessment and Management of Hazardous Ground Gases.* NSW Environment Protection Authority.

USEPA. (1999a). *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.* Second Edition: United States Environment Protection Agency.

USEPA. (1999b). *Compendium Method TO-15 Determination of Volatile Organic Compounds (VOCs) In Air Collected in Specially-Prepared Canisters and Analysed By Gas Chromatography Mass Spectrometry (GC/MS).* United States Environment Protection Agency.

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Appendix E

Site Assessment Criteria

Appendix E
Site Assessment Criteria
Lot 1 DP 1263364, Jerrabomberra

E1.0 Introduction

E1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).

E1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: High school – equivalent to recreational.
    - Corresponding to land use category 'C', public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate.
- Soil type: sand

E2.0 Soils

E2.1 Health Investigation and Screening Levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 1 and Table 2.

Table 1: Health Investigation Levels (mg/kg)

Contaminant	HIL-C
Metals	
Arsenic	300
Cadmium	90
Chromium (VI)	300
Copper	17 000
Lead	600
Mercury (inorganic)	80
Nickel	1200
Zinc	30 000
PAH	
B(a)P TEQ	3
Total PAH	300
Phenols	
Phenol	40 000
OCP	
DDT+DDE+DDD	400
Aldrin and dieldrin	10
Chlordane	70
Endosulfan	340
Endrin	20
Heptachlor	10
HCB	10
Methoxychlor	400
OPP	
Chlorpyrifos	250
PCB	
PCB	1

Table 2: Health Screening Levels (mg/kg)

Contaminant	HSL-C

Contaminant	HSL-C
SAND	**0 m to <1 m**
Benzene	NL
Toluene	NL
Ethylbenzene	NL
Xylenes	NL
Naphthalene	NL
TRH F1	NL
TRH F2	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX

TRH F2 is TRH >C_{10}-C_{16} minus naphthalene

The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

Table 3: Health Screening Levels for Direct Contact (mg/kg)

Contaminant	DC HSL-C	DC HSL-IMW
Benzene	120	1100
Toluene	18 000	120 000
Ethylbenzene	5300	85 000
Xylenes	15 000	130 000
Naphthalene	1900	29 000
TRH F1	5100	82 000
TRH F2	3800	62 000
TRH F3	5300	85 000
TRH F4	7400	12 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX

TRH F2 is TRH >C_{10}-C_{16} minus naphthalene

IMW intrusive maintenance worker

E2.2 Asbestos in Soil

Based on the CSM and/or current site access limitations, a detailed asbestos assessment was not considered to be warranted at this stage. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site.

Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this investigation / assessment as an initial screen.

E2.3 Ecological Investigation Levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 5, with inputs into their derivation shown in Table 4.

Table 4: Inputs to the Derivation of the Ecological Investigation Levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	Site has been used for agricultural purposes since at least 1917
pH	6.75	Laboratory Analysis
CEC	$cmol_c/kg$	Laboratory Analysis
Traffic volumes	low	Low traffic within the site
State / Territory	NSW	Site is within NSW

Table 5: Ecological Investigation Levels (mg/kg)

Contaminant	EIL-A-B-C
Metals	
Arsenic	100
Copper	200
Nickel	160
Chromium III	410
Lead	1100
Zinc	470
PAH	
Naphthalene	170
OCP	
DDT	180

Notes: EIL-AES area of ecological significance

E2.4 Ecological Screening Levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 6.

Table 6: Ecological Screening Levels (mg/kg)

Contaminant	Soil Type	EIL-A-B-C
Benzene	Coarse	50
Toluene	Coarse	85
Ethylbenzene	Coarse	70
Xylenes	Coarse	105
TRH F1	Coarse/ Fine	180*
TRH F2	Coarse/ Fine	120*
TRH F3	Coarse	300
TRH F4	Coarse	2800
B(a)P	Coarse	0.7

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene

E2.5 Management Limits

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

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure eg: penetration of, or damage to, in-ground services.

The adopted management limits are in Table 7.

Table 7: Management Limits (mg/kg)

Contaminant	Soil Type	ML-A-B-C
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	2500
TRH F4	Coarse	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene

E2.6 Preliminary Waste Classification Criteria

It is understood that during construction, it is likely that excavation of up to 2,000 m^2 of material will be in surplus and potential be required within the footprint of the proposed building.

For disposal of the material to a suitably licensed waste disposal facility in the NSW, classification of the soils should be undertaken with reference to the reference to the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014). The waste classification criteria for general waste are shown in Table 8.

Table 8: Waste Classification of General Solid Waste

Analyte	Maximum values of specific contamination concentration (SCC) for classification without TCLP	Maximum values for leachable concentration (TCLP) and total concentration (SCC) when used together	
	General Solid Waste CT1 (mg/kg)	Leachable concentration (TCLP1) (mg/L)	Total concentration (SCC1) (mg/kg)
Arsenic	100	5.0	500
Cadmium	20	1.0	100
Chromium	100	0.5	1900
Lead	100	5	1500
Mercury	4	0.2	50
Nickel	40	2	1050
Benzene	10	0.5	18
Toluene	288	1.44	518
Ethylbenzene	600	14.4	1080
Xylene	1000	50	1800
TRH (C_6-C_9)	650	NA	650
TRH (C_{10}-C_{36})	10000	NA	10000
Benzo(a)pyrene	0.8	0.004	10
Total PAHs	200	NC	200
Phenol	288	14.4	518
Total PCBs	<50	NC	<50
Schedules Chemicals	<50	NA	<50

E3.0 References

ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australia and New Zealand Environment and Conservation Council.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP).* Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water.*

NHMRC, NRMMC. (2016). *Australian Drinking Water Guidelines 6 2011, Version 3.2.* Canberra: National Health and Medical Research Council, National Resource Management Ministerial Council.

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

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Appendix F

Borehole Logs

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

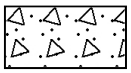
Symbols & Abbreviations

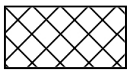
Graphic Symbols for Soil and Rock

General

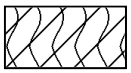

Asphalt

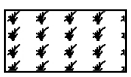

Road base

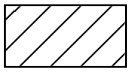

Concrete

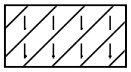

Filling

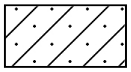
Soils


Topsoil

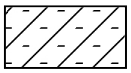

Peat

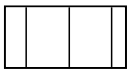

Clay

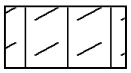

Silty clay

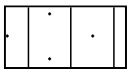

Sandy clay

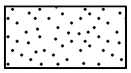

Gravelly clay

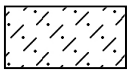

Shaly clay

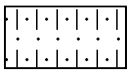

Silt


Clayey silt


Sandy silt

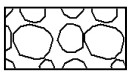

Sand

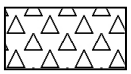

Clayey sand


Silty sand


Gravel

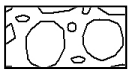

Sandy gravel


Cobbles, boulders

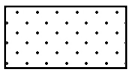

Talus

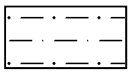
Sedimentary Rocks

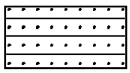

Boulder conglomerate

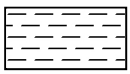

Conglomerate


Conglomeratic sandstone

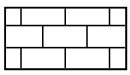

Sandstone


Siltstone

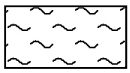

Laminite

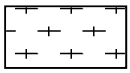

Mudstone, claystone, shale

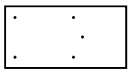

Coal


Limestone

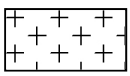
Metamorphic Rocks

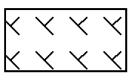

Slate, phyllite, schist

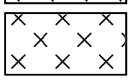

Gneiss

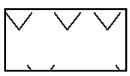

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 599.5 AHD
EASTING: 699117
NORTHING: 6081810
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 94188.02
DATE: 15-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
599	0.1	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E			PID = 1.2 ppm
	0.4	Clayey Silty SAND (SM): fine to coarse grained, brown, low plasticity silt and clay, trace fine gravel, moist to dry, medium dense to dense, colluvial							D E S			PID = 1.3 ppm 13,21,40 N = 61
598	1	Silty SAND (SM): fine to coarse grained, pale brown, trace fine gravel and low plasticity clay, dry to moist, very dense, colluvial							D E			PID = 0.5 ppm
									D E S			PID = 0.0 ppm 27,30/100 refusal
597	2								D			
									D			
	3								D S			15,30/50 refusal
596	3.2	Clayey SAND (SW): fine to coarse grained, pale brown, low plasticity clay, trace fine gravel, dry to moist, very dense, possible residual/extremely weathered rhyodacite							D			
	4								D			
595						▷						
594	5	RHYODACITIC IGNIMBRITE: fine to coarse grained, brown, mottled dark brown, dry to moist, extremely low to very low strength, highly weathered, highly fractured						5.07m: J, 20°, ir, vr 5.13m: J, 20°, ir, vr 5.19m: J, 30°, pl, sm, fe stn 5.2m: End of run	C	11	0	PL(A) = 0.03
	5.65							5.21m: - 5.65m: CORE LOSS CORE LOSS: 440mm 5.79m: J, 5°, vr, pl 5.82m: J, 85°, pl, sm, fe stn 5.88m: J, 10°, vr, pl 5.96m: J, 10°, ir, vr 6m: End of run	C	44	18	PL(D) = 0
593	6	Bore discontinued at 6.0m -limit of investigation										
592	7											
591	8											
590	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 4.0m

TYPE OF BORING: 110mm solid flight auger to 4.00m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 4.6m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 604.25 AHD
EASTING: 699164
NORTHING: 6081804
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 94188.02
DATE: 15-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
604	0.2	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL		E	0.1		PID = 0.6 ppm		
		Silty Sandy CLAY (CL): low plasticity, brown, mottled red-brown, fine to coarse grained sand, trace rootlets, moist to dry, w<PL, stiff to very stiff, possible residual/colluvial		D E S	0.5		PID = 0.5 ppm 6,16,20 N = 36		
603	1			D E	0.95 1.0		PID = 0.7 ppm		1
	1.3								
	1.6	Clayey SAND (SC): fine to coarse grained, brown, low plasticity clay, trace fine gravel, dry to moist, dense to very dense, extremely weathered rhyodacite		D S	1.5 1.78		16,30/120 refusal		
602	2	RHYODACITIC IGNIMBRITE: fine to coarse grained, brown, mottled dark brown, dry to moist, very low to low strength, extremely to highly weathered, highly fractured		D	2.0				2
				D E	2.5		PID = 1.3 ppm		
601	3			D S	3.0		8,18,26 N = 44		3
				D	3.45 3.5				
600	4			D	4.0				4
				D S	4.5 4.73		4,30/75 refusal		
599	5			D	5.0				5
	6			D S	6.0		1,18,30/20 refusal		6
598	6.32	Bore discontinued at 6.32m -limit of investigation			6.32				
597	7								7
596	8								8
595	9								9

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 1.5m

TYPE OF BORING: 110mm solid flight auger to 1.60m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 605.0 AHD
EASTING: 699191
NORTHING: 6081775
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 94188.02
DATE: 15-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		B - Bedding J - Joint; S - Shear F - Fault	EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00					
605	0.15	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E			PID = 0.1 ppm
		Silty CLAY (CL): low plasticity, red, mottled brown, with fine grained sand, trace rootlets, dry to moist, w<PL, stiff, possible residual or colluvial							D E S			PID = 1.0 ppm 10,10,18 N = 28
604	1								D E			PID = 0.5 ppm
	0.9											
	1.4	Sandy CLAY (CL/CI): low to medium plasticity, pale brown, mottled brown, fine to medium grained sand, dry to moist, w<PL, stiff to very stiff, residual							D S			20,30/100 refusal
603	2	SAND (SW): fine to coarse grained, pale brown, mottled yellow, with low plasticity clay, trace fine gravel, dry to moist, very dense, extremely weathered rhyodacitic ignimbrite							D D			
602	3								D S			10,21,35 N = 56
									D E			PID = 0.2 ppm
601	4								D			
600	5								D S			4,27,26 N = 53
									D D			
	5.65	RHYODACITE IGNIMBRITE: fine to coarse grained, brown, mottled blue, moist, low to medium strength, moderately weathered, highly fractured						5.5m: CORE LOSS: 150mm 5.68m: - 5.71m: He J, 30°, pl, fe stn, cly co 5.73m: J, 20°, cu, sm, fe stn 5.8m: -6.00m: V J, 90°, pl, sm 5.85m: J, 75°, pl, sm, fe stn 5.92m: J, 15°, pl, sm, fe stn, cly vn 5.95m: J, 45°, pl, sm, fe stn 6m: - 6.10m: DB 6.1m: - 6.20m: CORE LOSS CORE LOSS: 100mm 6.2m: End of run 6.64m: J, 65°, pl, sm, fe stn 7m: End of run	C	82	49	
599	6											
	6.2	-from 6.2m, pale blue, mottled grey, dry to moist, very high strength, slightly weathered, slightly fractured							C	100	100	PL(D) = 4.9 PL(A) = 5.02 PL(D) = 4.51 UCS = 34.0 MPa
598	7											
	7.0	Bore discontinued at 7.0m -limit of investigation										
597	8											
596	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 5.5m

TYPE OF BORING: 110mm solid flight auger to 5.50m, then NMLC coring to 7.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 4.2m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 604.75 AHD
EASTING: 699249
NORTHING: 6081781
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 94188.02
DATE: 16-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
604	0.2	TOPSOIL/Silty CLAY (CL): low plasticity, dark brown, with rootlets, trace fine to medium grained sand and fine gravel, moist, firm to stiff, TOPSOIL							E			PID = 0.1 ppm
	0.7	Silty CLAY (CL): low plasticity. red-brown, with fine to coarse grained sand, dry to moist, w<PL, very stiff, possible residual or colluvial							D E S			PID = 0.1 ppm 8,11,12 N = 23
603	1.5	Sandy CLAY (CL): low plasticity, pale red-brown, fine to coarse grained sand, with silt, dry to moist, w<PL, very stiff to hard, possible residual							D E D S			PID = 0.0 ppm 25,15/70 refusal
602	2.6	RHYODACITIC IGNIMBRITE: fine to coarse grained, yellow-brown, dry to moist, very low to low strength, highly weathered, fractured						2.5m: CORE LOSS: 100mm	D E S C	50	50	~~PID = 5.0 ppm~~ 25/45 refusal
	3	-from 2.6m, yellow-brown, -from 2.9m, medium strength, moderately weathered, highly fractured						2.7m: End of run 2.8m: J, 40°, ir, ro, stn 2.89m: J, 10°, pl, ro, stn 3m: DB				PL(A) = 0.08 PL(D) = 0.09
601	4	-from 3.15m, pale grey-blue/pale grey-brown -from 3.5m, high strength, slightly weathered						3.15m: J, 65°, pl, ro, stn, cly vn 3.22m: J, 45°, pl, sm, stn, cly vn 3.27m: J, 45°, pl, ro, stn 3.42m: J, 75°, cu, sm, stn	C	100	47	PL(D) = 1.01 PL(A) = 0.09
600	5	-from 4.40m, blue-grey/grey-blue, very high strength -from 5.0m, fresh strained						3.5m: - 3.91m: J, 45°-55°, pl, sm, fe stn 4m: End of run 4.2m: J, 40°, pl, ro, stn 4.22m: J, 5°, pl, ro, stn 4.34m: J, 5°, ir, ro 4.57m: J, 50°, st, sm, fe stn	C	100	91	PL(A) = 3.57 PL(D) = 6.84
599	6 6.0	Bore discontinued at 6.0m -limit of investigation						4.74m: - 4.92m: J, 65°, pl, sm, fe stn 5m: DB 5.3m: End of run	C	100	100	PL(D) = 5.64 PL(A) = 3.83 UCS = 31.4 MPa
598	7											
597	8											
596	9											
595												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** SDG/EAGL **CASING:** HQ from 2.5m

TYPE OF BORING: 110mm solid flight auger to 2.50m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 3.6m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.0 AHD
EASTING: 69918
NORTHING: 6081768
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 94188.02
DATE: 16-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low / Very Low / Low / Medium / High / Very High / Ex High		0.01 / 0.05 / 0.10 / 0.50 / 1.00	B - Bedding J - Joint S - Shear F - Fault				
600	0.2	TOPSOIL/Silty CLAY (CL): low plasticity, dark brown, with rootlets, trace fine to medium grained sand and fine gravel, moist, firm to stiff, TOPSOIL							E			PID = 1.0 ppm
									D			PID = 2.3 ppm
									E			4,6,8
									S			N = 14
599	1 1.0	Silty CLAY (CL): low plasticity, brown, mottled red, with fine to medium grained sand, with rootlets, moist to dry, w<PL, stiff, possible colluvial							D			PID = 2.0 ppm
									E			
		SAND (SW): fine to coarse grained, pale brown, with low plasticity clay, trace fine gravel, dry to moist, medium dense							D			
									S			10,12,13
598	2	-from 1.5m, extremely weathered rhyodacitic ignimbrite							D			N = 25
									D			
597	3								D			PID = 0.4 ppm
									E			4,30/50
									S			refusal
									D			
596	4 4.0	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist, extremely low to low strength, highly weathered, highly fractured						4m: CORE LOSS: 230mm	C	100	92	
	4.23	-from 4.4m, very low						4.26m: J, 10°, ir, vr 4.395m: J, 45° un, vr	C	100	100	
								4.42m: He J, 5°, pl 4.46m: J, 10°, un, vr 4.5m: End of run 4.7m: DB 4.9m: H J, 60°, pl 5m: DB				PL(D) = 0.13 PL(D) = 0.11 PL(A) = 0.03 PL(A) = 0.06 PL(D) = 0.06 PL(D) = 0.05 PL(A) = 0.02
595	5	-from 5.3m, pale brown-orange						5.07m: He J, 15°, pl, cly co 2mm 5.15m: He J, 70°, pl, fe stn				
		-from 5.7m, extremely low to very low strength						5.3m: He J, 60°, pl, fe stn 5.33m: J, 40°, pl, vr, fe stn, cly vn 5.465m: He J, 5°, pls, cly co 5.5m: J, 40°, pl, sm, fe stn, cly vn 5.52m: J, 10°, ir, vr, fe stn 5.57m: He J, 60°, pl, fe stn, cly co 2mm 5.64m: He J, 20°, cly co 1mm 5.83m: He J, 45°, pl 5.9m: J, 30°, pl, vr, fe stn, cly vn 5.95m: DB				
594	6 6.0	Bore discontinued at 6.0m -limit of investigation						6m: End of run				
593	7											
592	8											
591	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 4.0m

TYPE OF BORING: 110mm solid flight auger to 4.00m, then NMLC coring to 6.0m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 3.75m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 604.75 AHD
EASTING: 699172
NORTHING: 6081755
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 94188.02
DATE: 17-3-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
604	0.1	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E U_{50}			PID = 0.0 ppm
	0.3	Silty CLAY (CL): low plasticity, brown, mottled red, with fine grained sand and rootlets, moist to dry, w<PL, stiff to very stiff, residual							D E S			PID = 0.0 ppm 24,28,30/130 refusal
603	1	SAND (SW): fine to coarse grained, pale brown, with low plasticity clay, trace fine gravel, dry to moist, very dense, extremely weathered rhyodacitic ignimbrite							D E D S			PID = 0.1 ppm 30/130 refusal
	2.0								D			
602	2.05	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist, low to medium strength, highly weathered, highly fractured -from 2.5m, medium strength, highly to moderately weathered						2m: CORE LOSS: 50mm 2.05m: - 2.10m: too fractured to distinguish 2.13m: He J, 60°, pl, fe stn 2.18m: J, 45°, ir, sm, fe stn 2.21m: He J, 35°, pl, fe stn 2.25m: He J, 35°, ir, fe stn 2.3m: He J, 60°, pl, fe stn 2.37m: J, 45°, un, sm, fe stn, cly vn 2.38m: - 2.47m: too fractured to distinguish 2.47m: J, 45°, un, sm, fe stn, cly vn 2.68m: J, 50°, cu, sm, fe stn, cly vn 2.84m: J, 45°, pl, ro, fe stn, cly vn 2.87m: - 3.00m: J, generally 40°-80°, pl, sm, fe stn, cly vn/co 3m: - 3.07m: too fractured to distinguish 3.14m: He J, 85°, pl, fe stn 3.2m: - 3.30m: too fractured to distinguish 3.34m: He J, 85°, un, cly vn 3.38m: J, 10°, pl, sm, cly vn 3.5m: J, 20°, stm ro, cly vn 3.59m: J, 10°, un, ro, cly vn 3.6m: J, generally 20°-30°, pl, ro, fe stn, cly vn or 80°, pl, ro, fe stn 3.81m: J, 45°, ir, ro, fe stn, cly co 2mm 3.89m: He J, 10°, pl 3.95m: DB 4m: J, 15°, pl, sm 4.07m: J, 80°, pl, sm, cly vn, fe stn 4.13m: J, 10°, un, ro, fe stn, cly vn 4.25m: He J, 50°, pl 4.27m: J, 80°, pl, sm, fe stn, cly vn 4.33m: J, 10°, pl, sm, fe stn, cly vn 4.41m: J, 75°, pl, sm, fe	C	96	65	PL(D) = 0.38
601	4								C	100	53	PL(A) = 0.02 PL(D) = 0.33
600	5	-from 5.0m, low strength, highly weathered							C	100	71	PL(D) = 0.21 PL(D) = 0.81 PL(A) = 0.27
599	6	Bore discontinued at 6.0m -limit of investigation										
598	6.0											
597	7											
596	8											
595	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 2.0m

TYPE OF BORING: 110mm solid flight auger to 2.00m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 604.75 AHD
EASTING: 699172
NORTHING: 6081755
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 94188.02
DATE: 17-3-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
594	11							stn, cly co 2mm 4.54m: He J, 5°, pl 4.55m: He J, 75°, un, cly co 2mm 4.62m: J, 45°, pl, sm, fe stn, cly vn 4.645m: J, 30°, un, ro, fe stn, cly vn 4.67m: J, 70°, ir, ro, fe stn 4.8m: DB 4.94m: He J, 80°, pl, fe stn 5m: J, 15°, ir, ro, fe stn 5.13m: He J, 75°, pl, fe stn 5.175m: J, 5°, pl, ro, fe stn, cly vn 5.23m: J, 20°, pl, ro, fe stn 5.24m: - 5.27m: too fractured to distinguish 5.37m: J, 10°, ir, ro, fe stn 5.45m: He J, 10°, pl, fe stn 5.47m: J, 15°, pl, ro, cly vn 5.58m: J, 20°, st, ro, fe stn, cly vn 5.59m: - 5.60m: too fractured to distinguish 5.7m: He J, 85°, pl, cly vn 5.76m: - 5.84m: too fractured to distinguish 5.9m: He J, 30°, pl, cly co 3mm 5.95m: - 6.00m: too fractured to distinguish				
593	12											
592	13											
591	14											
590	15											
589	16											
588	17											
587	18											
586	19											
585												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 2.0m

TYPE OF BORING: 110mm solid flight auger to 2.00m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 603.75 AHD
EASTING: 699224
NORTHING: 6081740
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 94188.02
DATE: 17-3-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
603	0.15	TOPSOIL/Sandy SAND (SM): fine to coarse grained, brown, low plasticity silt, with fine to medium gravel, moist to dry, medium dense, TOPSOIL							E			PID = 3.7 ppm
	0.4	SAND (SW): fine to coarse grained, pale brown, with low plasticity clay, trace fine gravel, dry to moist, very dense, extremely weathered rhyodacitic ignimbrite							D E S			PID = 8.6 ppm 25,30/75 refusal
602	1	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, mottled red-brown, dry to moist, very low to low strength, highly weathered, highly fractured with occasional extremely weathered seams							D E			PID = 14.7ppm
	2								D E S			PID = 3.8 ppm 30/135 refusal
									D			
601	2.8							2.5m: CORE LOSS: 300mm	D			
	3							2.92m: J, 30°, ir, ro, fe stn 3m: J, 45°, pl, ro, fe stn 3.05m: J, 15°, ir, ro, fe stn 3.09m: J, 70°, pl, ro, fe stn 3.14m: End of run	C			PL(A) = 0.25 PL(D) = 0.06
600	4							3.2m: J, 85°, pl, sm, fe stn 3.23m: J, 5°, ir, ro, fe stn 3.27m: J, 5°, ir, ro, fe stn 3.32m: J, 5°, ir, ro, fe stn	C			
	4.1	-from 4.5m, fractured						3.33m: - 3.44m: too fractured to distinguish 3.445m: J, 10°, ir, ro, fe stn 3.5m: - 3.57m: too fractured to distinguish 3.59m: J, 5°, ir, ro, fe stn	C			PL(D) = 0.07 UCS = 2.7 MPa
599	5	-from 5.1m, brown -from 5.27m, fragmented										
598	6	-from 5.6m, low strength						3.6m: CORE LOSS: 500mm	C			PL(D) = 0.11
	6.0	Bore discontinued at 6.0m -limit of investigation						4.13m: J, 20°, un, ro, fe stn, cly vn 4.27m: J, 30°, un, ro, fe stn 4.3m: J, 20°, ir, ro, fe stn 4.355m: J, 10°, un, ro, fe stn 4.42m: J, 45°, pl, sm, fe stn 4.43m: - 4.51m: too fractured to distinguish 4.51m: J, 20°, ir, ro 4.67m: J, 60°, pl, ro, fe stn 4.75m: He J, 50°, pl, fe stn 4.83m: He J, 45°, pl, fe stn 5m: J, 20°, pl, ro, fe stn 5.06m: J, 50°, pl, ro, fe stn 5.16m: J, 50°, pl, ro, fe stn 5.27m: - 5.60m: too fractured to distinguish 5.6m: End of run 5.65m: J, 10°, un, ro, fe stn 5.81m: J, 30°, ir, sm, fe stn				
597	7											
596	8											
595	9											
594												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 2.5m

TYPE OF BORING: 110mm solid flight auger to 2.50m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 2.5m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 603.75 AHD
EASTING: 699224
NORTHING: 6081740
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 94188.02
DATE: 17-3-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
593	11							5.84m: J, 45°, pl, sm, fe stn 5.88m: J, 5°, ir, ro, fe stn 5.97m: J, 45°, pl, sm, fe stn 6m: End of run				
592	12											
591	13											
590	14											
589	15											
588	16											
587	17											
586	18											
585	19											
584												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 2.5m

TYPE OF BORING: 110mm solid flight auger to 2.50m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 2.5m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 599.25 AHD
EASTING: 699107
NORTHING: 6081727
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 94188.02
DATE: 17 - 18/3/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low / Very Low / Low / Medium / High / Very High / Ex High		0.01 / 0.05 / 0.10 / 0.50 / 1.00	B - Bedding J - Joint S - Shear F - Fault				
599	0.2	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E U_{50}			PID = 20.2 ppm
	0.5	Silty SAND (SM): fine to coarse grained, red, mottled brown, trace fine gravel and rootlets, moist to dry, medium dense, colluvial							D E S			PID = 41.2 ppm 1,3,8 N = 11
598	1											PID = 3.5 ppm
	1.2	Sandy CLAY (CL): low plasticity, red, mottled brown, fine to coarse grained sand, trace fine gravel, moist to dry, w<PL, stiff to very stiff, colluvial							D E D			
	1.5								S			8,19,17 N = 36
597	2	SAND (SW): fine to coarse grained, red, mottled brown, with low plasticity clay and fine gravel, moist to dry, dense, extremely weathered rhyodacitic ignimbrite							D E D			PID = 1.2 ppm
	3	RHYODACITIC IGNIMBRITE: fine to coarse grained, red, mottled brown, dry to moist, low strength, highly weathered, highly fractured						2.7m: - 3.00m: fg 3m: - 3.10m: fg 3.16m: J, 85°, pl, sm, fe stn, cly vn 3.18m: J, 45°, pl, sm, fe stn, cly vn	C	100	0	
596		-from 2.7m, medium to high strength, moderately weathered, fragmented							C	100	0	
	4	-from 3.1m, , fractured to highly fractured						3.22m: - 3.37m: J, generally 20°-40° or 80°, pl/ir, sm-ro, fe stn, cly vn 3.42m: J, 45°, un, sm, fe stn 3.47m: J, 20°, pl, sm, cly vn	C	100	28	PL(D) = 3.1 PL(D) = 3.34 PL(D) = 4.54
595		-from 3.8m, very high strength, highly fractured										
		-from 4.0m, fractured										
		-from 4.15m, pale blue, moderately to slightly weathered										
594	5	-from 5.0m, slightly weathered						3.5m: - 3.67m: J, generally 30°-50°, pl, sm, fe stn 3.68m: - 3.78m: too fractured to distinguish 3.87m: J, 55°, pl, sm, fe stn, cly vn 4.05m: He J, 30°, pl, cly vn	C	100	48	PL(D) = 5.18 UCS = 116.3 MPa
	6	-from 5.8m, very high to extremely high strength, fresh, unbroken						4.13m: J, 30°, ir, ro, cly co 2mm 4.26m: J, 45°, un, sm, fe stn	C	100	100	PL(A) = 4.7 PL(D) = 9.58
593	6.26	Bore discontinued at 6.26m -limit of investigation						4.48m: J, 30°, ir, ro, fe stn 4.49m: - 4.55m: too fractured to distinguish 4.55m: DB - End of run 4.69m: He J, 50°, pl 4.79m: J, 50°, pl, sm, fe stn, cly vn 4.8m: -4.83m: fg 4.87m: J, 60°, pl, sm, fe stn 5m: J, 5°, un, sm 5.56m: - 5.61m: fg 5.59m: J, 20°, un, sm, fe stn, cly vn 5.64m: He J, 80°, un 5.7m: DB - End of run 6.26m: DB - End of run				
592	7											
591	8											
590	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** TBO/EAGL **CASING:** HQ from 2.7m

TYPE OF BORING: 110mm solid flight auger to 2.70m, then NMLC coring to 6.26m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 3.95m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 605.75 AHD
EASTING: 699188
NORTHING: 6081706
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 94188.02
DATE: 18-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
605	0.15	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E			PID = 7.9 ppm
	0.3	Clayey SAND (SC): fine to coarse grained, brown, low plasticity clay, trace low strength rhyodacitic gravel to 15mm, dry to moist, dense to very dense, extremely weathered rhyodacitic ignimbrite							D E S			PID = 14.2 ppm 23,25/30 refusal
	1								D E			PID = 5.1 ppm
604		RHYODACITIC IGNIMBRITE: fine to coarse grained, brown, dry to moist, very low to low strength, extremely to highly weathered, highly fractured						1.59m: J, 30°, pl, ro, fe stn	S			25/50 refusal
	2	-from 1.5m, very low to low strength, extremely to highly weathered, highly fractured						1.66m: J, 50°, ir, sm, fe stn 1.82m: J, 25°, ir, ro, fe stn 1.92m: J, 25°, ir, ro, fe stn 1.96m: J, 20°, ir, ro, fe stn	C	88	63	PL(D) = 0.15 PL(A) = 0.09 PL(D) = 0.03 PL(A) = 0.18
603	3							2.12m: J, 50°, ir, ro, fe stn 2.16m: J, 5°, ir, ro, fe stn 2.32m: J, 50°, pl, ro, fe stn				
	3.15	-from 3.15m, highly weathered						2.42m: J, 5°, ir, ro, fe stn, cly vn 2.475m: He J, 30°, pl 2.61m: He J, 10°, ir 2.635m: J, 20°, ir, ro, fe stn, cly vn	C	88		PL(A) = 0.01 PL(D) = 0.1
602	4	-from 4.0m, low to medium strength, highly to moderately weathered, highly fractured						2.66m: J, 70°, pl, sm, fe stn, cly vn				
	4.5							2.73m: J, 10°, ir, ro, fe stn, cly vn 2.81m: J, 5°, ir, ro, cly vn 2.82m: CORE LOSS: 330mm	C	90		PL(D) = 0.47 PL(A) = 0.3
601	5	-from 5.0m, medium strength, moderately weathered, highly fractured										PL(D) = 0.79
		-from 5.5m, low to medium strength, distinctly weathered, highly fractured				▷		3.15m: - 3.19m: too fractured to distinguish 3.21m: J, 60°, ir, ro, fe stn, cly vn	C	100		PL(D) = 0.22
600	6	-from 6.0m, medium strength, moderately weathered, highly fractured						3.23m: - 3.27m: too fractured to distinguish 3.3m: - 3.90m: J, generally 15°-30°, ir, ro, fe stn, cly vn				UCS = 2.8 MPa
	6.3	Bore discontinued at 6.3m -limit of investigation						3.9m: - 4.00m: too fractured to distinguish 4.1m: He J, 50°, pl, fe stn 4.2m: fg 4.4m: CORE LOSS: 100mm 4.51m: - 5.00m: J, generally 20°-30° or 70°, pl - ir, ro, fe stn 4.61m: J, 5°, pl, sm, fe stn 5m: - 5.27m: J, generally 45°-60°, pl/ir, ro, fe stn 5.27m: - 5.45m: too fractured to distinguish 5.45m: DB 5.46m: - 6.3m: J, generally 20°-50°, ir, ro, fe stn				
599	7											
598	8											
597	9											
596												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 1.5m

TYPE OF BORING: 110mm solid flight auger to 1.50m, then NMLC coring to 6.30m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 5.7m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 598.75 AHD
EASTING: 699097
NORTHING: 6081688
DIP/AZIMUTH: 90°/--

BORE No: 10
PROJECT No: 94188.02
DATE: 18-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
598	0.2	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL		E	0.1		PID = 0.5 ppm		
				D	0.5				
	0.55	Clayey SAND (SC): fine to coarse grained, red brown, low plasticity clay, trace silt, dry to moist, dense to very dense, extremely weathered rhyodacitic ignimbrite		S			26,32,30/100 refusal		
					0.8				
597	1	RHYODACITIC IGNIMBRITE: fine to coarse grained, brown, dry to moist		D	1.0		PID = 0.3 ppm		
				E					
		-from 1.2m, pale brown		E	1.5		PID = 0.4 ppm		
				S	1.6		30/100 refusal		
596	2			D	2.0				
				E	2.5				
	2.9								
595	3	SAND (SW): fine to coarse grained, brown/pale brown, trace low plasticity fines, dry to moist, dense, extremely weathered rhyodacite			3.0				
				S			40 refusal		
				E	3.45				
	3.7				3.5				
594	4	RHYODACITIC IGNIMBRITE: fine to coarse grained, brown, dry to moist, extremely low to very low strength, extremely to highly weathered, highly fractured							
		-from 4.20m, very low strength, highly weathered, highly fractured		D	4.5				
				E					
593	5	-from 4.70m, low strength, highly weathered, highly fractured							
		-from 5.00m, low to medium strength, highly to moderately weathered, highly fractured							
		-from 5.50m, low strength, highly weathered, highly fractured		E	5.5				
592	6			D	6.0		30/20 refusal		
	6.02	Bore discontinued at 6.02m		S	6.02				
		-limit of investigation							
591	7								
590	8								
589	9								

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** N/A

TYPE OF BORING: 110mm solid flight auger to 6.02m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 603.5 AHD
EASTING: 699157
NORTHING: 6081677
DIP/AZIMUTH: 90°/--

BORE No: 11
PROJECT No: 94188.02
DATE: 18-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
603	0.3	TOPSOIL/Silty Sandy CLAY (C:): low plasticity, brown, fine to coarse grained sand, with rootlets, dry to moist, w<PL, stiff to very stiff, TOPSOIL		E	0.1		PID = 1.9 ppm		
		Clayey SAND (SC): fine to coarse grained, red brown, low plasticity clay, trace silt, dry to moist, dense to very dense, extremely weathered rhyodacitic ignimbrite		D E S	0.5		PID = 2.0 ppm 3,11,14 N = 25		
	1			D E	0.95 1.0		PID = 3.0 ppm		1
602	1.3	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist		S	1.5		17,40/130 refusal		
		-from 1.8m, very low strength			1.78				
	2	-from 2.1m, very low to low strength		D E	2.5				2
601	3	-from 2.8m, low strength, highly weathered		D S	3.0		20,40/110 refusal		3
		-from 3.15m, very low to low strength			3.26				
600					3.5				
	4				3.9				4
599		-from 4.2m, extremely low to very low strength, extremely weathered		D E S	4.5 4.65		13,28,34 N = 62		
	5				4.95				5
598				E	5.5 5.55 5.6				
	6	-from 5.8m, very low strength, extremely to highly weathered, highly fractured		S	6.0		25/120 refusal		6
	6.12	-from 6.0m, low strength, highly weathered			6.12				
597		Bore discontinued at 6.12m -limit of investigation							
	7								7
596									
	8								8
595									
	9								9
594									

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** N/A

TYPE OF BORING: 110mm solid flight auger to 6.12m

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.5 AHD
EASTING: 699132
NORTHING: 6081649
DIP/AZIMUTH: 90°/--

BORE No: 12
PROJECT No: 94188.02
DATE: 18-3-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
600	0.15	TOPSOIL/Silty Sandy CLAY (C:): low plasticity, brown, fine to coarse grained sand, with rootlets, dry to moist, w<PL, stiff to very stiff, TOPSOIL							E U_{50}			PID = 2.9 ppm
									D			PID = 2.9 ppm
	0.8	Clayey SAND (SC): fine to coarse grained, pale grey-brown, low plasticity clay, trace low strength rhyodacitic gravel to 15mm, dry to moist, very dense, extremely weathered rhyodacitic ignimbrite							E S			20,40/120 refusal
599	1								E			PID = 0.8 ppm
									E S			32,40/60 refusal
	2	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist, very low strength, extremely to highly weathered, fragmented -from 1.8m, very low to low strength							D			
598									E			
	3	-from 2.7m, low strength, highly weathered, highly fractured							S			20,35/20 refusal
597		-from 3.5m, very low to low strength, highly weathered, highly fractured						3.48m: - 3.50m: fg 3.52m: J, 88°, pl, ro 3.55m: - 3.59m: fg 3.65m: He J, 85°, pl, ro	C	100	0	
	4							3.67m: J, 75°, pl 3.7m: J, 45°, pl, ro, fe stn 3.72m: J, 20°, pl, sm, fe stn	C	88	56	PL(D) = 0.08 PL(A) = 0.08 PL(D) = 0.3
596	4.1	-from 4.1m, low strength				▷		3.73m: - 3.76m: fg 3.78m: J, 85°, pl, sm, fe stn 3.8m: J, 85°, pl, sm, fe stn 3.82m: J, 10°, st, ro, fe stn 3.83m: - 4.00m: fg				PL(D) = 0.08
	5							4m: CORE LOSS: 100mm	C	100	62	
595		-from 5.6m, medium strength, highly to moderately weathered, fractured										PL(A) = 0.37 PL(D) = 0.44
	6	Bore discontinued at 6.0m -limit of investigation										
594	6.0							4.1m: - 4.12m: fg 4.23m: J, 10°, un, ro 4.35m: J, 65°, pl, sm, fe stn 4.41m: J, 50°, sm, pl 4.42m: - 4.44m: J, 60°, sm, pl, fe stn, 10mm spacing 4.43m: J, 5°, pl, ro 4.48m: - 4.51m: J, 50°, pl, ro, 10mm spacing 4.49m: J, 40°, pl, ro 4.56m: J, 65°, st, sm, fe stn 4.78m: - 4.80m: fg 4.8m: - 4.83m: fg 5m: J, 5°, cu, sm, cly inf 5.1m: J, 20°, un, he 5.18m: J, 50°, cu, sm, fe stn 5.31m: J, 45°, pl, sm, fe stn 5.32m: J, 10°, pl, sm, fe stn 5.33m: J, 45°, pl, ro, fe stn 5.4m: J, 50°, pl, sm, fe stn 5.52m: J, 10°, un, ro				
593	7											
592	8											
591	9											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 3.0m

TYPE OF BORING: 110mm solid flight auger to 3.40m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 4.7m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.5 AHD
EASTING: 699132
NORTHING: 6081649
DIP/AZIMUTH: 90°/--

BORE No: 12
PROJECT No: 94188.02
DATE: 18-3-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
590	11							5.58m: J, 40°, un, ro 5.59m: J, 5°, pl, ro 5.61m: J, 10°, pl, ro 5.75m: - 5.77m: J, 15°-40°, pl, ro, 5mm spacing 5.8m: J, 30°, pl, ro 5.82m: J, 5°, un, ro 5.91m: - 6.00m: fg				
589	12											
588	13											
587	14											
586	15											
585	16											
584	17											
583	18											
582	19											
581												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 3.0m

TYPE OF BORING: 110mm solid flight auger to 3.40m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 4.7m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.5 AHD
EASTING: 699208
NORTHING: 6081641
DIP/AZIMUTH: 90°/--

BORE No: 13
PROJECT No: 94188.02
DATE: 19-3-2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
600	0.15	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E U_{50}			PID = 1.3 ppm
	0.4	Clayey SAND (SC): fine to coarse grained, red brown, low plasticity clay, dry to moist, dense to very dense, extremely weathered rhyodacitic ignimbrite							D E S			PID = 1.7 ppm 11,26,40/100 refusal
599	1	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist, very low strength, extremely to highly weathered, highly fractured -from 1.8m, very low to low strength							E D S			PID = 1.8 ppm 17,42,25/40 refusal
598	2								E D			
597	3	-from 3.2m, low strength, highly weathered							S			12,35/100 refusal
		-from 3.6m, highly to moderately weathered						3.7m: J, 50°, un, sm, fe stn, cly vn	C	80	40	PL(A) = 0.09 PL(D) = 0.16
	4	-from 4.0m, moderately weathered						3.76m: J, 5°, ir, ro, fe stn, cly vn 3.78m: J, 5°, ir, ro, fe stn, cly vn 3.88m: J, 45°, ir, ro, fe stn, cly vn				PL(A) = 1.94 PL(D) = 1.8
596	4.1	-from 4.1m, high strength, moderately to slightly weathered, highly fractured -from 4.45m, pale blue -from 4.7m, blue, very high to extremely high strength, slightly weathered to fresh, slightly fractured to unbroken						4m: CORE LOSS: 100mm 4.1m: End of run 4.2m: J, 10°, ir, ro, fe stn, cly vn 4.25m: J, 50°, pl, sm, fe stn 4.445m: J, 10°, ir, ro, fe stn 4.5m: J, 85°, pl/cu, sm, fe stn, cly vn 4.88m: J, 60°, pl, sm 5m: DB 5.08m: DB 5.2m: J, 20°, ir, sm 5.31m: J, 75°, pl, sm, fe stn 5.4m: End of run 5.47m: J, 25°, ir, ro 6m: DB 6.07m: J, 80°, ir, ro 6.15m: End of run	C	100	82	PL(D) = 10.52 PL(A) = 7.2 PL(D) = 8.72
595	5											PL(D) = 8.85
	6								C	100	71	UCS = 131.4 MPa
	6.15	Bore discontinued at 6.15m -limit of investigation										
594	7											
593	8											
592	9											
591												

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 3.6m

TYPE OF BORING: 110mm solid flight auger to 3.60m, then NMLC coring to 6.15m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 4.0m 24 hrs after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.0 AHD
EASTING: 699233
NORTHING: 6081673
DIP/AZIMUTH: 90°/--

BORE No: 14
PROJECT No: 94188.02
DATE: 19-3-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
600		TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine grained sand, with rootlets, moist, firm to stiff, TOPSOIL							E			PID = 1.4 ppm
	0.35	RHYODACITIC IGNIMBRITE: fine to coarse grained, pale brown, dry to moist, extremely low to very low strength, extremely to highly weathered, fragmented							D E S			PID = 4.8 ppm 13,28,25/50 refusal
599	1	-from 0.9m, very low to low strength							D E S			PID = 4.3 ppm 28/20 refusal
		-from 1.3m, very low strength						1.62m: J, pl, 30°, vr, fe stn	C	100	25	PL(A) = 0.71 PL(D) = 0.99
		-from 1.4m, low strength, highly weathered, highly fractured						1.65m: J, 35°, ir, ro, fe stn, cly vn				
598	2	-from 1.5m, low to medium strength, highly to moderately weathered, fractured						1.66m: - 1.90m: J, generally 20°-45°, ir, pl, ro, fe stn, cly vn	C	100	10	PL(D) = 1.15
		-from 1.8m, medium strength, moderately weathered						1.9m: End of run				
		-from 2.4m, medium to high strength						1.91m: - 2.26m: J, generally 20°-45°, ir, pl, ro, fe stn, cly vn				
597	3							2.32m: J, 80°, pl, ro, cly vn				
								2.36m: J, 30°, pl, ro, cly vn				PL(D) = 1.05
								2.4m: J, 40°, ir, ro, fe stn	C	85	12	
596	4							2.46m: He J, 45°				
								2.59m: H, 20°, ir, sm, fe stn, cly vn				
	4.36	-from 4.3m, medium to high strength, moderately weathered, fractured						2.71m: He J, 35°, pl, cly vn				PL(D) = 0.65
								2.8m: J, 45°, pl, sm, cly vn	C	94	27	PL(A) = 1.03
595	5							2.84m: J, 45°, pl, sm, cly vn				
								2.96m: J, 45°, pl, sm, fe stn	C	100	0	
		-from 5.4m, low to medium strength, highly to moderately weathered						3m: J, 55°, pl, sm, cly vn				
								3.13m: He J, 10°, ir				
						▼		3.18m: Too fractured to distinguish	C	100	30	PL(D) = 0.37
		-from 5.8m, medium to high strength, moderately weathered, fractured						3.2m: End of run				PL(A) = 0.51
594	6 6.0	Bore discontinued at 6.0m -limit of investigation						3.3m: J, 20°, st, sm, cly vn, fe stn				PL(D) = 1.94
								3.48m: J, 30°, ro, pl, fe stn				
								3.52m: J, 75°, ir, ro, fe stn, cly vn				
593	7							3.65m: J, 745°, pl, sm, fe stn, cly vn				
								3.75m: J, 20°, ro, un, fe stn, cly vn				
								3.78m: J, 5°, pl, sm, cly vn				
								3.85m: J, 45°, pl, sm, fe stn				
592	8							3.91m: - 4.12m: too fractured to distinguish				
								4.12m: CORE LOSS: 240mm				
								4.25m: End of run				
								4.43m: J, 5°, vr, pl				
								4.46m: J, 30°, pl, sm, cly vn				
591	9							4.52m: J, 30°, ir, sm, cly vn				
								4.57m: J, 60°, pl, sm, fe stn, cly vn				
								4.68m: J, 10°, un, ro, cly vn				
								4.74m: J, 10°, un, ro, cly vn				

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 1.5m

TYPE OF BORING: 110mm solid flight auger to 1.50m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 5.7m after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: NSW Department of Education
PROJECT: Jerrabomberra High School
LOCATION: Part Lot 1 DP 1263364, Jerrabomberra

SURFACE LEVEL: 600.0 AHD
EASTING: 699233
NORTHING: 6081673
DIP/AZIMUTH: 90°/--

BORE No: 14
PROJECT No: 94188.02
DATE: 19-3-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
590								4.9m: End of run 4.91m: - 5.0m: too fractured to distinguish 5m: J, 45°, pl, cly vn 5.09m: J, 30°, st, ro, fe stn, cly vn 5.13m: J, 20°, sm, pl, fe stn, cly vn 5.22m: J, 20°, pl, sm, fe stn, cly vn 5.23m: - 5.4m: too fractured to distinguish 5.4m: End of run 5.41m: - 5.48m: too fractured to distinguish 5.66m: J, 30°, pl, ro, cly vn 5.76m: J, 45°, pl, vr, fe stn, cly co 5mm 5.87m: J, 30°, pl, sm, fe stn, cly vn 6m: End of run				
589	11											
588	12											
587	13											
586	14											
585	15											
584	16											
583	17											
582	18											
581	19											

RIG: EVH2100 **DRILLER:** S2S **LOGGED:** ADFH/EAGL **CASING:** HQ from 1.5m

TYPE OF BORING: 110mm solid flight auger to 1.50m, then NMLC coring to 6.00m

WATER OBSERVATIONS: No groundwater observed during augering or coring. Groundwater observed at 5.7m after the BH was drilled.

REMARKS: Location coordinates are in MGA94 Zone 55. Surface levels and coordinates are approximate only and must not be relied upon. GW assumed to be driller's water/mud.

SAMPLING & IN SITU TESTING LEGEND

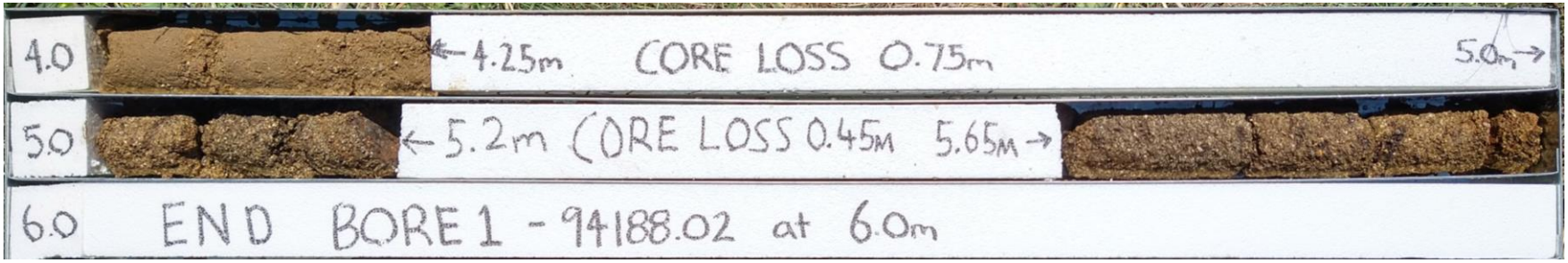
A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

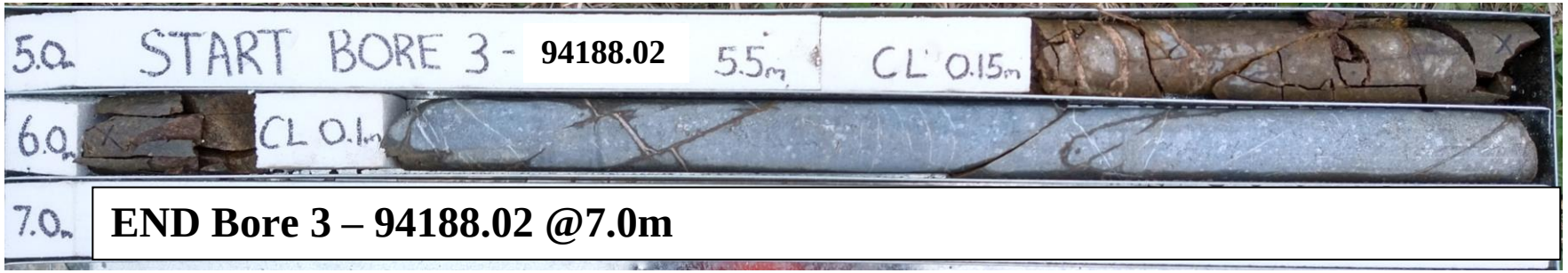
BORE: 1 DEPTH: 4.0 m –6.0 m PROJECT: 94188.02 March 2021



DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 3 DEPTH: 5.5 m –7.0 m PROJECT: 94188.02 March 2021

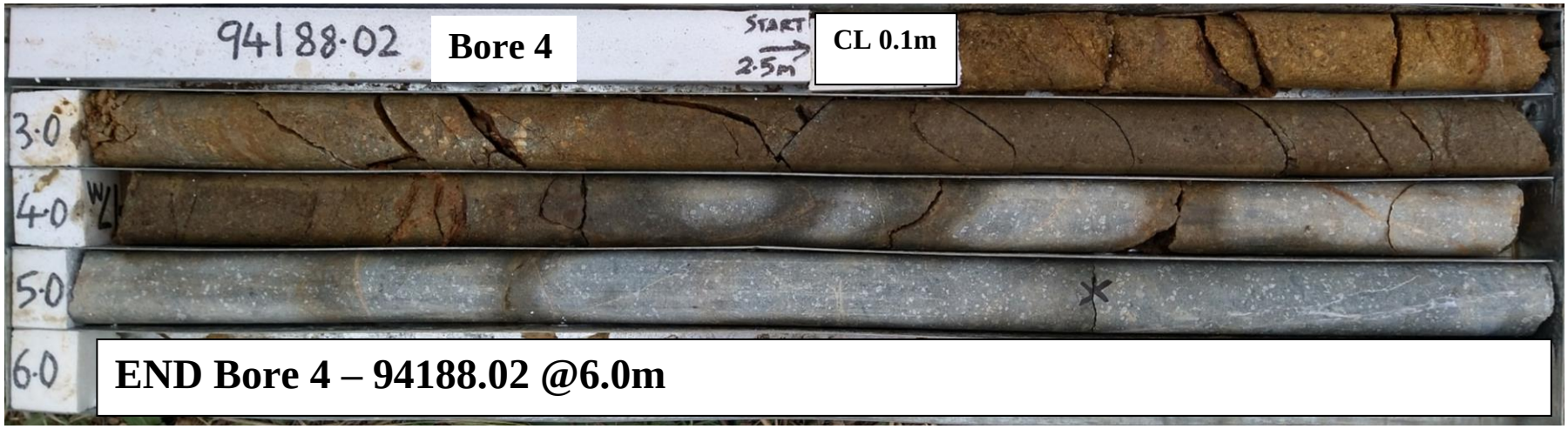


END Bore 3 – 94188.02 @7.0m

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

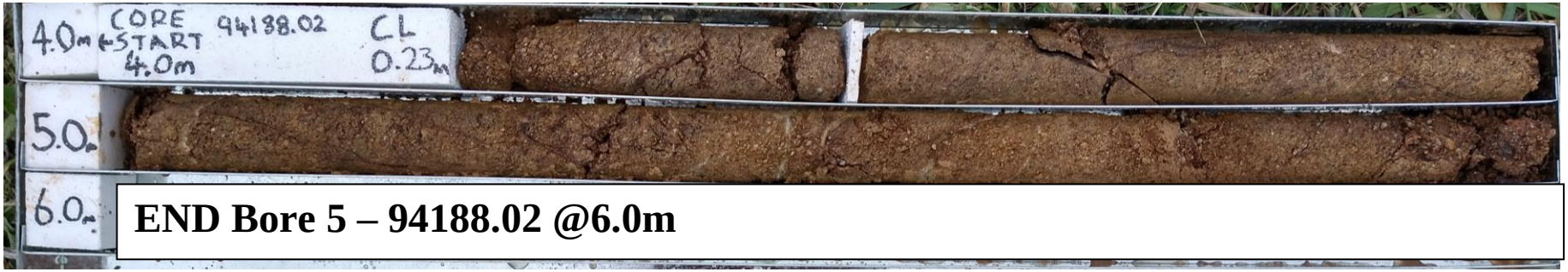
BORE: 4 DEPTH: 2.5 m –6.0 m PROJECT: 94188.02 March 2021



DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 5 DEPTH: 4.0 m –6.0 m PROJECT: 94188.02 March 2021



END Bore 5 – 94188.02 @6.0m

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 6 DEPTH: 2.0 m –6.0 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 7 DEPTH: 2.5 m –6.0 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 8 DEPTH: 2.7 m –6.26 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 9 DEPTH: 1.5 m –6.3 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 12 DEPTH: 3.4 m –6.0 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 13 DEPTH: 3.6 m –6.15 m PROJECT: 94188.02 March 2021

DOUGLAS PARTNERS PTY LTD

PROPOSED JERRABOMBERRA HIGH SCHOOL
PART LOT 1 DP 1263364, JERRABOMBERRA, NSW

BORE: 14 DEPTH: 1.5 m –6.0 m PROJECT: 94188.02 March 2021

END Bore 14 – 94188.02 @6.0m

Appendix G

Laboratory Sample Receipt, Chain of Custody, Laboratory Certificate

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94188.02	**Suburb:**	Jerrabomberra	**To:**	ALS 277-289 Woodpark Road Smithfield NSW Australia 2164
Project Name:	Jerrabomberra	**Order Number**			
Project Manager	Shannon Goodsell	**Sampler:**	Elliot Luck	**Attn:**	
Emails:	shannon.goodsell@douglaspartners.com			**Phone:**	
Date Required:	Standard			**Email:**	
Prior Storage:	Fridge	Do samples contain 'potential' HBM?	No		

	Sample ID	Lab ID	Date Sampled	Sample Type (S - soil W - water)	Container Type (G - glass P - plastic)	Analytes: 8 Heavy Metals	TRH BTEX	PAH	OCP/OPP	phenols	Asbestos	Hold			Notes/preservation
1	RR1		15/03/21	S	G	X	X	X	X	X	X				
2	RR2		18/03/21	S	G							X			
	PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes**	

Environmental Division
Sydney
Work Order Reference
ES2110545

Telephone : +61-2-8784 8555

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: 2 **Relinquished by:** SDG **Transported to laboratory by:** TNT

Send Results to: Douglas Partners Pty Ltd **Address:** shannon.goodsell@douglaspartners.com.au **Phone:** **Fax:**

Signed: **Received by:** **Date & Time:**

rec: FMM 24/3/21 10:40am

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au

Brisbane (07) 3237 8900	**Cairns** (07) 4055 1550	**Canberra** (02) 6260 2788	**Central Coast** (02) 4351 1422	**Coffs Harbour** (02) 6650 3200	**Darwin** (08) 8948 6800
Geelong (03) 5221 0711	**Gold Coast** (07) 5568 8900	**Macarthur** (02) 4647 0075	**Melbourne** (03) 9673 3500	**Newcastle** (02) 4960 9600	**Perth** (08) 9204 3511
Port Macquarie (02) 6581 5992	**Nth West Sydney** (02) 4666 0450	**Sunshine Coast** (07) 5351 0400	**Sydney** (02) 9809 0666	**Townsville** (07) 4779 9866	**Wollongong** (02) 4271 1836

Head Office
PO Box 472
West Ryde NSW 1685

To: ALS Environmental

Attn:

Purchase Order No. 155054

Date: 23/3/21

This order covers the supply of goods, materials or services shown here, subject to the conditions and instructions shown on the reverse.

Quantity	Description	Rate	Amount	Project No. & Accounts Code
1	Soil testing as per COC			94188.02

Please deliver to:

Douglas Partners Pty Ltd

elliott.luck@douglaspartners.com.au

Name of Authorising Officer: Elliott Luck

Signature: Eluck

Contact Phone No: 02 6260 2788

SCC0215

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

*lab to dry

Project No:	94188.02	**Suburb:** Jerrabomberra	**To:** ENVIROLAB
Project Name:	Jerrabomberra	**Order Number**	
Project Manager	Shannon Goodsell	**Sampler:** Elliot Luck	**Attn:** Aileen Hie
Emails:	shannon.goodsell@douglaspartners.com		**Phone:**
Date Required:	Standard		**Email:**
Prior Storage:	Fridge	Do samples contain 'potential' HBM? No	

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil W - water)	Container Type (G - glass P - plastic)	Analytes: Comb. 8a	Comb. 6a	Aggressivity and Salinity Suite	pH	CEC	Hold	Heavy metals and PAH	BTEX	Notes/preservation
BH01/0.1	1	15/03/21	S	G	X								
BH01/0.5	2	15/03/21	S	G						X			
BH01/1.0	3	15/03/21	S	G						X			
BH01/1.5	4	15/03/21	S	G						X			
BH02/0.1	5	15/03/21	S	G		X	SS			X			
BH02/0.5	6	15/03/21	S	G		X							
BH02/1.0	7	15/03/21	S	G						X			
BH02/1.5	8	15/03/21	S	G						X			
BH03/0.1	9	15/03/21	S	G	X								
BH03/0.5	10	15/03/21	S	G						X			
BH03/1.0	11	15/03/21	S	G				X	X				
BH03/3.5	12	15/03/21	S	G						X			
BH04/0.1	13	16/03/21	S	G						X			
BH04/0.5	14	16/03/21	S	G						X			
BH04/1.0	15	16/03/21	S	G		X							
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Lab Report/Reference No:

Metals to Analyse: 8HM unless specified here:

Total number of samples in container: 2 **Relinquished by:** SDG **Transported to laboratory by:** TNT

Send Results to: Douglas Partners Pty Ltd **Address:** shannon.goodsell@douglaspartners.com.au **Phone:** **Fax:**

Signed: **Received by:** **Date & Time:** 23/3/21 1040

		Date	Sample Type	Container Type	Analytes

COC: 24/3/21 1119.

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 265015
Date Received: 23/3/21
Time Received: 1040
Received By: AB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94188.02	**Suburb:** Jerrabomberra	**To:** ENVIROLAB
Project Name:	Jerrabomberra	**Order Number**	
Project Manager	Shannon Goodsell	**Sampler:** Elliot Luck	**Attn:** Aileen Hie
Emails:	shannon.goodsell@douglaspartners.com		**Phone:**
Date Required:	Standard		**Email:**
Prior Storage:	Fridge	Do samples contain 'potential' HBM? No	

Sample ID	Lab ID	Sampling Date	S - soil W - water	G - glass P - plastic	Comb. 8a	Comb. 6a	Aggressivity and Salinity Suite	pH	CEC	Hold	Heavy metals	BTEX	Notes/preservation
BH04/2.5	16	16/03/21	S	G						X			
BH05/0.1	17	16/03/21	S	G	X								
BH05/0.5	18	16/03/21	S	G						X			
BH05/1.0	19	16/03/21	S	G						X			
BH05/3.0	20	16/03/21	S	G						X			
BH06/0.1	21	17/03/21	S	G						X			
BH06/0.5	22	17/03/21	S	G			X						
BH06/1.0	23	17/03/21	S	G		X							
BH07/0.1	24	17/03/21	S	G		X							
BH07/0.5	25	17/03/21	S	G						X			
BH07/1.0	26	17/03/21	S	G						X			
BH07/1.5	27	17/03/21	S	G						X			
BH08/0.1	28	17/03/21	S	G						X			
BH08/0.5	29	17/03/21	S	G						X			
BH08/1.0	30	17/03/21	S	G		X							
PQL (S) mg/kg											**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container:	**Relinquished by:** SDG	**Transported to laboratory by:** TNT	
Send Results to: Douglas Partners Pty Ltd	**Address:** shannon.goodsell@douglaspartners.com.au	**Phone:**	**Fax:**
Signed:	**Received by:**	**Date & Time:** 23/3/21 1040	

		Date	Sample Type	Container Type	Analytes

265015

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 94188.02	**Suburb:** Jerrabomberra	**To:** ENVIROLAB	
Project Name: Jerrabomberra	**Order Number**		
Project Manager Shannon Goodsell	**Sampler:** Elliot Luck	**Attn:** Aileen Hie	
Emails: shannon.goodsell@douglaspartners.com		**Phone:**	
Date Required: Standard		**Email:**	
Prior Storage: Fridge	Do samples contain 'potential' HBM? No		

Sample ID	Lab ID	Sampling Date	S - soil W - water	G - glass P - plastic	Comb. 8a	Comb. 6a	Aggressivity and Salinity Suite	pH	CEC	Hold	Heavy metals and PAH	BTEX	Notes/preservation
BH08/2.0	31	17/03/21	S	G			X						
BH09/0.1	32	18/03/21	S	G						X			
BH09/0.5	33	18/03/21	S	G	X								
BH09/1.0	34	18/03/21	S	G						X			
BH10/0.1	35	18/03/21	S	G		X							
BH10/0.5	36	18/03/21	S	G						X			
BH10/1.0	37	18/03/21	S	G						X			
BH10/1.5	38	18/03/21	S	G						X			
BH10/2.5	39	18/03/21	S	G						X			
BH10/3.5	40	18/03/21	S	G						X			
BH10/4.5	41	18/03/21	S	G						X			
BH10/5.5	42	18/03/21	S	G						X			
BH11/0.1	43	18/03/21	S	G	X								
BH11/0.5	44	18/03/21	S	G						X			
BH11/1.0	45	18/03/21	S	G						X			
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Lab Report/Reference No:

Metals to Analyse: 8HM unless specified here:

Total number of samples in container: **Relinquished by:** SDG **Transported to laboratory by:** TNT

Send Results to: Douglas Partners Pty Ltd **Address:** shannon.goodsell@douglaspartners.com.au **Phone:** **Fax:**

Signed: **Received by:** **Date & Time:** 23/3/21 1040

		Date	Sample Type	Container Type	Analytes

26501 5

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	94188.02	**Suburb:** Jerrabomberra	**To:** ENVIROLAB
Project Name:	Jerrabomberra	**Order Number**	
Project Manager	Shannon Goodsell	**Sampler:** Elliot Luck	**Attn:** Aileen Hie
Emails:	shannon.goodsell@douglaspartners.com		**Phone:**
Date Required:	Standard		**Email:**
Prior Storage:	Fridge	Do samples contain 'potential' HBM? No	

Sample ID	Lab ID	Sampling	S - soil W - water	G - glass P - plastic	Comb. 8a	Comb. 6a	Aggressivity and Salinity		pH	CEC	Hold	Heavy metals and PAH	BTEX	Notes/preservation
BH11/2.5	46	18/03/21	S	G							X			
BH11/6.0	47	18/03/21	S	G							X			
BH12/0.1	48	18/03/21	S	G							X			
BH12/0.5	49	18/03/21	S	G							X			
BH12/1.0	50	18/03/21	S	G	X									
BH13/0.5	51	19/03/21	S	G	X									
BH13/1.0	52	19/03/21	S	G							X			
BH13/2.0	53	19/03/21	S	G							X			
BH14/0.1	54	19/03/21	S	G							X			
BH14/0.5	55	19/03/21	S	G							X			
BH14/1.0	56	19/03/21	S	G		X								
R1	57	15/03/21	S	G								X		
R2	58	18/03/21	S	G							X			
TB1	59	19/03/21	S	G									X	
TS1	60	19/03/21	S	G									X	
PQL (S) mg/kg			S	G								**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container:	**Relinquished by:** SDG	**Transported to laboratory by:** TNT	
Send Results to: Douglas Partners Pty Ltd	**Address:** shannon.goodsell@douglaspartners.com.au	**Phone:**	**Fax:**
Signed:	**Received by:** A-BV1	**Date & Time:** 23/3/21 0940	

11/4.0 61
12/1.5 62
12/2.5 63
} extras received.

255015

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES2110545**

Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SHANNON GOODSELL	Contact	: Sepan Mahamad
Address	: 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 2114	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: shannon.goodsell@douglaspartners .com.au	E-mail	: Sepan.Mahamad@ALSGlobal.com
Telephone	: +61 02 9809 0666	Telephone	: +61 2 8784 8555
Facsimile	: +61 02 9809 4095	Facsimile	: +61-2-8784 8500
Project	: 94188.02 Jerrabomberra	Page	: 1 of 2
Order number	: 155054	Quote number	: EM2017DOUPAR0002 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Jerrabomberra		
Sampler	: Elliot Luck		

Dates

Date Samples Received	: 24-Mar-2021 10:40	Issue Date	: 24-Mar-2021
Client Requested Due Date	: 31-Mar-2021	Scheduled Reporting Date	: **31-Mar-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 10.0' C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 2 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Asbestos will not be analysed as no seperate container received.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

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

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-12 OC/OP Pesticides	SOIL - S-27 TRH/BTEXN/PAH/Phenols/8Metals
ES2110545-001	15-Mar-2021 00:00	RR1		✓	✓	✓
ES2110545-002	18-Mar-2021 00:00	RR2	✓			

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE INVOICES

- A4 - AU Tax Invoice (INV)	Email	apinvoices@douglaspartners.com.au

SHANNON GOODSELL

- *AU Certificate of Analysis - NATA (COA)	Email	shannon.goodsell@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	shannon.goodsell@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	shannon.goodsell@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	shannon.goodsell@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	shannon.goodsell@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	shannon.goodsell@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	shannon.goodsell@douglaspartners.com.au

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Canberra
Attention	Shannon Goodsell

Sample Login Details

Your reference	94188.02, Jerrabomberra
Envirolab Reference	265015
Date Sample Received	23/03/2021
Date Instructions Received	24/03/2021
Date Results Expected to be Reported	31/03/2021

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	63 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	16
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Extra samples received:
11/4.0
12/1.5
12/2.5

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils	Misc Inorg - Soil	CEC	On Hold
BH01/0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH01/0.5												✓
BH01/1.0												✓
BH01/1.5												✓
BH02/0.1	✓	✓	✓	✓	✓	✓	✓		✓			
BH02/0.5												✓
BH02/1.0												✓
BH02/1.5												✓
BH03/0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH03/0.5												✓
BH03/1.0										✓	✓	
BH03/3.5												✓
BH04/0.1												✓
BH04/0.5												✓
BH04/1.0	✓	✓	✓	✓	✓	✓	✓		✓			
BH04/2.5												✓
BH05/0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH05/0.5												✓
BH05/1.0												✓
BH05/3.0												✓
BH06/0.1												✓
BH06/0.5										✓	✓	
BH06/1.0	✓	✓	✓	✓	✓	✓	✓		✓			
BH07/0.1	✓	✓	✓	✓	✓	✓	✓		✓			
BH07/0.5												✓
BH07/1.0												✓
BH07/1.5												✓
BH08/0.1												✓
BH08/0.5												✓
BH08/1.0	✓	✓	✓	✓	✓	✓	✓		✓			
BH08/2.0										✓		
BH09/0.1												✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils	Misc Inorg - Soil	CEC	On Hold
BH09/0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH09/1.0												✓
BH10/0.1	✓	✓	✓	✓	✓	✓	✓		✓			
BH10/0.5												✓
BH10/1.0												✓
BH10/1.5												✓
BH10/2.5												✓
BH10/3.5												✓
BH10/4.5												✓
BH10/5.5												✓
BH11/0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH11/0.5												✓
BH11/1.0												✓
BH11/2.5												✓
BH11/6.0												✓
BH12/0.1												✓
BH12/0.5												✓
BH12/1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH13/0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH13/1.0												✓
BH13/2.0												✓
BH14/0.1												✓
BH14/0.5												✓
BH14/1.0	✓	✓	✓	✓	✓	✓	✓		✓			
R1			✓				✓					
R2												✓
TB1	✓											
TS1	✓											
11/4.0												✓
12/1.5												✓
12/2.5												✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

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Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2110545**	Page	: 1 of 7
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SHANNON GOODSELL	Contact	: Sepan Mahamad
Address	: 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 2114	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9809 0666	Telephone	: +61 2 8784 8555
Project	: 94188.02 Jerrabomberra	Date Samples Received	: 24-Mar-2021 10:40
Order number	: 155054	Date Analysis Commenced	: 25-Mar-2021
C-O-C number	: ----	Issue Date	: 30-Mar-2021 10:29
Sampler	: Elliot Luck		
Site	: Jerrabomberra		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

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

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

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

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

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

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005: Poor precision was obtained for Chromium on sample ES2110351-#001. Results have been confirmed by re-extraction and reanalysis.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	RR1	----	----	----	----
				Sampling date / time	15-Mar-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2110545-001	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		12.2	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		27	----	----	----	----
Copper	7440-50-8	5	mg/kg		12	----	----	----	----
Lead	7439-92-1	5	mg/kg		24	----	----	----	----
Nickel	7440-02-0	2	mg/kg		10	----	----	----	----
Zinc	7440-66-6	5	mg/kg		61	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	RR1	----	----	----	----
				Sampling date / time	15-Mar-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2110545-001	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	----	----	----
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	----	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	----	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	----	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	----	----	----	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	RR1	----	----	----	----
				Sampling date / time	15-Mar-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2110545-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)A: Phenolic Compounds - Continued									
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	----	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg		<2	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	RR1	----	----	----	----
				Sampling date / time	15-Mar-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES2110545-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**79.3**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**77.8**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**88.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**93.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**98.7**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**106**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**118**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**107**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**81.0**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**94.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**93.5**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES2110545**	Page	: 1 of 10
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SHANNON GOODSELL	Contact	: Sepan Mahamad
Address	: 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 2114	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9809 0666	Telephone	: +61 2 8784 8555
Project	: 94188.02 Jerrabomberra	Date Samples Received	: 24-Mar-2021
Order number	: 155054	Date Analysis Commenced	: 25-Mar-2021
C-O-C number	: ----	Issue Date	: 30-Mar-2021
Sampler	: Elliot Luck		
Site	: Jerrabomberra		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 1		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

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

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3585532)									
ES2110545-001	RR1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	27	27	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	10	9	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	12	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	24	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	61	66	6.88	0% - 50%
ES2110351-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	42	# 76	58.0	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	21	15	33.4	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	13	21	47.6	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	76	64	17.8	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	96	80	18.3	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	922	828	10.8	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3585533)									
ES2110351-003	Anonymous	EA055: Moisture Content	----	0.1	%	14.3	15.5	8.55	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3585531)									
--------		EG035T: Mercury	7439-97-6	0.1	mg/kg	----	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3584848)									
ES2110373-001	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3584848) - continued									
ES2110373-001	Anonymous	EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<1.0	<1.0	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<1.0	<1.0	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3584848)									
ES2110373-001	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.25	<0.25	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<1.0	<1.0	0.00	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<1.0	<1.0	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<1.0	<1.0	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 3584846)									
ES2110373-001	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP075(SIM)A: Phenolic Compounds (QC Lot: 3584846) - continued									
ES2110373-001	Anonymous	EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3584846)									
ES2110373-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3584783)									
ES2110486-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3584845)									
ES2110373-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	1110	1190	6.20	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	670	690	2.43	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3584783)									
ES2110486-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3584845)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3584845) - continued									
ES2110373-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	1590	1670	5.14	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	390	390	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	80	80	0.00	No Limit
EP080: BTEXN (QC Lot: 3584783)									
ES2110486-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3585532)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	91.6	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	89.5	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	20.2 mg/kg	97.8	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	103	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	62.1 mg/kg	91.0	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.4 mg/kg	88.0	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	162 mg/kg	66.5	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3585531)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.073 mg/kg	85.7	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3584848)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.6	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	81.2	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	87.4	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	87.5	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	78.3	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	100	66.0	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	82.7	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.6	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.4	69.0	115
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	106	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	62.0	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	96.6	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	103	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	93.3	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3584848)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	102	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	62.0	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3584848) - continued								
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	90.1	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	84.7	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.0	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.3	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	102	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	87.0	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	88.7	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	103	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	81.8	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.2	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.1	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	100	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	94.3	41.0	123
EP075(SIM)A: Phenolic Compounds (QCLot: 3584846)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	83.3	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	88.8	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	89.6	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	92.3	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	54.9	54.0	114
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	87.2	68.0	126
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	90.6	66.0	120
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	96.4	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	82.4	70.0	116
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	82.3	54.0	114
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	90.9	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	41.5	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3584846)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	96.1	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	97.7	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	94.6	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	94.1	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	102	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	108	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	102	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	106	74.0	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3584846) - continued								
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	88.9	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	95.7	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	83.7	68.0	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	99.3	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	92.5	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	91.7	61.0	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	91.0	62.0	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	93.0	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584783)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	99.7	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584845)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	116	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	104	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	93.6	71.0	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584783)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	91.2	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584845)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	110	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	100	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	77.8	63.0	131
EP080: BTEXN (QCLot: 3584783)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	105	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	99.6	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.9	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	82.5	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	82.0	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	98.0	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3585532)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3585532) - continued							
ES2110351-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	127	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	87.0	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	85.6	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	100	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	72.3	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	83.7	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	112	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3585531)							
ES2110351-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	86.2	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3584848)							
ES2110373-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	107	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	88.8	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	93.1	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	95.0	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	81.0	70.0	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	83.2	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3584848)							
ES2110373-001	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	93.2	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	92.8	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	82.0	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	80.7	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	87.9	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 3584846)							
ES2110373-001	Anonymous	EP075(SIM): Phenol	108-95-2	10 mg/kg	80.2	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	88.7	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	62.1	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	91.3	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	63.6	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3584846)							
ES2110373-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	92.0	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	90.8	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584783)							
ES2110486-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	93.4	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3584845)							
ES2110373-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	108	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	102	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	113	52.0	132

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584783)							
ES2110486-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	92.9	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3584845)							
ES2110373-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	109	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	112	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	88.7	52.0	132
EP080: BTEXN (QCLot: 3584783)							
ES2110486-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	81.1	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	87.4	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	83.5	70.0	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	85.7	70.0	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	83.5	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.8	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2110545**	Page	: 1 of 5
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: SHANNON GOODSELL	Telephone	: +61 2 8784 8555
Project	: 94188.02 Jerrabomberra	Date Samples Received	: 24-Mar-2021
Site	: Jerrabomberra	Issue Date	: 30-Mar-2021
Sampler	: Elliot Luck	No. of samples received	: 2
Order number	: 155054	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005(ED093)T: Total Metals by ICP-AES	ES2110351--001	Anonymous	**Chromium**	7440-47-3	58.0 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) RR1	**15-Mar-2021**	**----**	----	----	**25-Mar-2021**	29-Mar-2021	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) RR1	**15-Mar-2021**	**25-Mar-2021**	11-Sep-2021	✓	**26-Mar-2021**	11-Sep-2021	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) RR1	**15-Mar-2021**	**25-Mar-2021**	12-Apr-2021	✓	**26-Mar-2021**	12-Apr-2021	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**26-Mar-2021**	04-May-2021	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**26-Mar-2021**	04-May-2021	✓
EP075(SIM)A: Phenolic Compounds							
Soil Glass Jar - Unpreserved (EP075(SIM)) RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**25-Mar-2021**	04-May-2021	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**25-Mar-2021**	04-May-2021	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**25-Mar-2021**	29-Mar-2021	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**25-Mar-2021**	29-Mar-2021	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
RR1	**15-Mar-2021**	**25-Mar-2021**	29-Mar-2021	✓	**25-Mar-2021**	29-Mar-2021	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	2	**50.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

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CERTIFICATE OF ANALYSIS 265015

Client Details

Client	Douglas Partners Canberra
Attention	Shannon Goodsell
Address	Unit 2, 73 Sheppard St,, HUME, ACT, 2620

Sample Details

Your Reference	**94188.02, Jerrabomberra**
Number of Samples	63 Soil
Date samples received	23/03/2021
Date completed instructions received	24/03/2021

Analysis Details

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

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

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

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	31/03/2021
Date of Issue	31/03/2021

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Analysed by Asbestos Approved Identifier: Nyovan Moonean
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Ken Nguyen, Reporting Supervisor
Lucy Zhu, Asbestos Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	109	115	99	94	104

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	98	94	94	96	95

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		265015-43	265015-50	265015-51	265015-56	265015-59
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0	TB1
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	101	98	102	100	122

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		265015-60
Your Reference	UNITS	TS1
Date Sampled		19/03/2021
Type of sample		Soil
Date extracted	-	25/03/2021
Date analysed	-	25/03/2021
Benzene	mg/kg	102%
Toluene	mg/kg	100%
Ethylbenzene	mg/kg	103%
m+p-xylene	mg/kg	105%
o-Xylene	mg/kg	104%
naphthalene	mg/kg	[NT]
Total +ve Xylenes	mg/kg	[NT]
Surrogate aaa-Trifluorotoluene	%	103

svTRH (C10-C40) in Soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	76	74	73	71	72

svTRH (C10-C40) in Soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	26/03/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	76	72	72	72	76

svTRH (C10-C40) in Soil					
Our Reference		265015-43	265015-50	265015-51	265015-56
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	72	72	71	72

PAHs in Soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<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
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	96	96	96	100	96

PAHs in Soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<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
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	99	98	97	100	97

PAHs in Soil						
Our Reference		265015-43	265015-50	265015-51	265015-56	265015-57
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0	R1
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021	15/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<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
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	97	98	99	98	91

Organochlorine Pesticides in soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	100	99	101	97

Organochlorine Pesticides in soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	102	99	102	102

Organochlorine Pesticides in soil					
Our Reference		265015-43	265015-50	265015-51	265015-56
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	101	102	102

Organophosphorus Pesticides in Soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	100	99	101	97

Organophosphorus Pesticides in Soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	102	99	102	102

Organophosphorus Pesticides in Soil					
Our Reference		265015-43	265015-50	265015-51	265015-56
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	101	102	102

PCBs in Soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	100	99	101	97

PCBs in Soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	102	99	102	102

PCBs in Soil					
Our Reference		265015-43	265015-50	265015-51	265015-56
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	100	101	102	102

Acid Extractable metals in soil						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Arsenic	mg/kg	4	<4	<4	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	21	25	28	19	13
Copper	mg/kg	9	9	7	17	8
Lead	mg/kg	17	20	15	36	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	7	8	7	7	7
Zinc	mg/kg	50	49	40	72	29

Acid Extractable metals in soil						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Arsenic	mg/kg	17	<4	<4	6	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	14	14	8	15
Copper	mg/kg	5	7	13	26	8
Lead	mg/kg	15	13	17	20	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	6	8	7	6
Zinc	mg/kg	47	63	42	130	41

Acid Extractable metals in soil						
Our Reference		265015-43	265015-50	265015-51	265015-56	265015-57
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0	R1
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021	15/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Arsenic	mg/kg	<4	<4	4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	12	8	9	25
Copper	mg/kg	6	6	6	7	9
Lead	mg/kg	18	13	24	22	21
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	4	5	7	6	8
Zinc	mg/kg	29	55	64	65	51

Acid Extractable metals in soil		
Our Reference		265015-64
Your Reference	UNITS	BH08/1.0 - [TRIPLICATE]
Date Sampled		17/03/2021
Type of sample		Soil
Date prepared	-	25/03/2021
Date analysed	-	25/03/2021
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	14
Copper	mg/kg	14
Lead	mg/kg	15
Mercury	mg/kg	<0.1
Nickel	mg/kg	7
Zinc	mg/kg	43

Misc Soil - Inorg						
Our Reference		265015-1	265015-9	265015-17	265015-33	265015-43
Your Reference	UNITS	BH01/0.1	BH03/0.1	BH05/0.1	BH09/0.5	BH11/0.1
Date Sampled		15/03/2021	15/03/2021	16/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg			
Our Reference		265015-50	265015-51
Your Reference	UNITS	BH12/1.0	BH13/0.5
Date Sampled		18/03/2021	19/03/2021
Type of sample		Soil	Soil
Date prepared	-	25/03/2021	25/03/2021
Date analysed	-	25/03/2021	25/03/2021
Total Phenolics (as Phenol)	mg/kg	<5	<5

Moisture						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Moisture	%	14	11	11	7.1	9.5

Moisture						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Moisture	%	3.8	6.3	7.4	4.5	7.7

Moisture						
Our Reference		265015-43	265015-50	265015-51	265015-56	265015-57
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0	R1
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021	15/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021
Date analysed	-	26/03/2021	26/03/2021	26/03/2021	26/03/2021	26/03/2021
Moisture	%	6.6	5.1	5.3	6.0	12

Asbestos ID - soils						
Our Reference		265015-1	265015-5	265015-9	265015-15	265015-17
Your Reference	UNITS	BH01/0.1	BH02/0.1	BH03/0.1	BH04/1.0	BH05/0.1
Date Sampled		15/03/2021	15/03/2021	15/03/2021	16/03/2021	16/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	31/03/2021	31/03/2021	31/03/2021	31/03/2021	31/03/2021
Sample mass tested	g	Approx. 25g	Approx. 25g	Approx. 25g	Approx. 30g	Approx. 25g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		265015-23	265015-24	265015-30	265015-33	265015-35
Your Reference	UNITS	BH06/1.0	BH07/0.1	BH08/1.0	BH09/0.5	BH10/0.1
Date Sampled		17/03/2021	17/03/2021	17/03/2021	18/03/2021	18/03/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	31/03/2021	31/03/2021	31/03/2021	31/03/2021	31/03/2021
Sample mass tested	g	Approx. 35g	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 30g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils					
Our Reference		265015-43	265015-50	265015-51	265015-56
Your Reference	UNITS	BH11/0.1	BH12/1.0	BH13/0.5	BH14/1.0
Date Sampled		18/03/2021	18/03/2021	19/03/2021	19/03/2021
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	31/03/2021	31/03/2021	31/03/2021	31/03/2021
Sample mass tested	g	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 25g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil				
Our Reference	UNITS	265015-11	265015-22	265015-31
Your Reference		BH03/1.0	BH06/0.5	BH08/2.0
Date Sampled		15/03/2021	17/03/2021	17/03/2021
Type of sample		Soil	Soil	Soil
Date prepared	-	29/03/2021	29/03/2021	29/03/2021
Date analysed	-	29/03/2021	29/03/2021	29/03/2021
pH 1:5 soil:water	pH Units	8.1	6.8	6.7
Electrical Conductivity 1:5 soil:water	µS/cm	[NA]	28	9
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	20	<10
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	20	20
Resistivity in soil*	ohm m	[NA]	350	1,100
Estimated Salinity*	mg/kg	[NA]	96	30

CEC			
Our Reference		265015-11	265015-22
Your Reference	UNITS	BH03/1.0	BH06/0.5
Date Sampled		15/03/2021	17/03/2021
Type of sample		Soil	Soil
Date prepared	-	29/03/2021	29/03/2021
Date analysed	-	29/03/2021	29/03/2021
Exchangeable Ca	meq/100g	9.8	2.4
Exchangeable K	meq/100g	0.2	0.4
Exchangeable Mg	meq/100g	5.8	0.59
Exchangeable Na	meq/100g	0.69	<0.1
Cation Exchange Capacity	meq/100g	16	3.4

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity (non NATA). Resistivity (calculated) may not correlate with results otherwise obtained using Resistivity-Current method, depending on the nature of the soil being analysed.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.

Method ID	Methodology Summary
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	119	118
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	119	118
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	119	106
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	117	106
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	116	120
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	121	128
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	119	124
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	101	1	109	109	0	93	87

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	30	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	30	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	30	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	30	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	30	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	30	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	30	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-023	[NT]	30	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	30	94	102	8	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	95
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	75	71
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	77	75
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	95
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	75	71
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	77	75
Surrogate o-Terphenyl	%		Org-020	80	1	76	75	1	102	74

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	30	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	30	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	30	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	30	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	30	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	30	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	30	72	70	3	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			26/03/2021	1	26/03/2021	26/03/2021		26/03/2021	26/03/2021
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	95
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	94
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	98
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	99
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	96
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	96
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	110
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	<0.05	<0.05	0	105	100
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	99	1	96	97	1	96	94

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	26/03/2021	26/03/2021		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	30	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	30	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	30	97	97	0	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			26/03/2021	1	26/03/2021	26/03/2021		26/03/2021	26/03/2021
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	96
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	91
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	91	87
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	99
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	97	93
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	97
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	97
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	91	80
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	81	79
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	93
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	102	1	100	98	2	101	97

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	26/03/2021	26/03/2021		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	30	99	99	0	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			26/03/2021	1	26/03/2021	26/03/2021		26/03/2021	26/03/2021
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	82
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	98
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	85	89
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	110
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	99
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	90
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	99
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	102	1	100	98	2	101	97

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	26/03/2021	26/03/2021		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	30	99	99	0	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date extracted	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			26/03/2021	1	26/03/2021	26/03/2021		26/03/2021	26/03/2021
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	90	80
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	102	1	100	98	2	101	97

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	26/03/2021	26/03/2021		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	30	99	99	0	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-5
Date prepared	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			25/03/2021	1	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Arsenic	mg/kg	4	Metals-020	<4	1	4	4	0	101	87
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	89
Chromium	mg/kg	1	Metals-020	<1	1	21	21	0	104	96
Copper	mg/kg	1	Metals-020	<1	1	9	9	0	101	100
Lead	mg/kg	1	Metals-020	<1	1	17	17	0	101	91
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	84	85
Nickel	mg/kg	1	Metals-020	<1	1	7	7	0	103	91
Zinc	mg/kg	1	Metals-020	<1	1	50	47	6	97	90

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Date analysed	-			[NT]	30	25/03/2021	25/03/2021		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	30	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	30	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	30	14	13	7	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	30	13	20	42	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	30	17	15	12	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	30	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	30	8	7	13	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	30	42	40	5	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	265015-50
Date prepared	-			25/03/2021	33	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Date analysed	-			25/03/2021	33	25/03/2021	25/03/2021		25/03/2021	25/03/2021
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	33	<5	<5	0	101	99

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			29/03/2021	[NT]	[NT]	[NT]	[NT]	29/03/2021	[NT]
Date analysed	-			29/03/2021	[NT]	[NT]	[NT]	[NT]	29/03/2021	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	96	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Estimated Salinity*	mg/kg	5	Inorg-034	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			29/03/2021	11	29/03/2021	29/03/2021		29/03/2021	[NT]
Date analysed	-			29/03/2021	11	29/03/2021	29/03/2021		29/03/2021	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	11	9.8	10	2	107	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	11	0.2	0.2	0	113	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	11	5.8	6.0	3	109	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	11	0.69	0.74	7	124	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 265015-30 for Cu. Therefore a triplicate result has been issued as laboratory sample number 265015-64.

Asbestos: A portion of the supplied samples were sub-sampled for asbestos
analysis according to Envirolab procedures.
We cannot guarantee that these sub-samples are indicative of the entire sample.
Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 265015-1,5,9,15,17,23,24,30,33,35,43,50,51,56 were sub-sampled from jars provided by the client.

Appendix H

Summarised Laboratory Results

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Table H1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			Metals								TRH						BTEX				PAH			
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	1	0.05	0.5	0.05
Sample ID	Depth	Sample Date	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
BH01/0.1	0 m	15/03/2021	4	<0.4	21	9	17	<0.1	7	50	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH02/0.1	0 m	15/03/2021	<4	<0.4	25	9	20	<0.1	8	49	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
R1	0 m	15/03/2021	<4	<0.4	25	9	21	<0.1	8	51	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<0.1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH03/0.1	0 m	15/03/2021	<4	<0.4	28	7	15	<0.1	7	40	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH04/1.0	0 m	16/03/2021	4	<0.4	19	17	36	<0.1	7	72	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH05/0.1	0 m	16/03/2021	<4	<0.4	13	8	13	<0.1	7	29	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH06/1.0	0 m	17/03/2021	17	<0.4	5	5	15	<0.1	4	47	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH07/0.1	0 m	17/03/2021	<4	<0.4	14	7	13	<0.1	6	63	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH08/1.0	0 m	17/03/2021	<4	<0.4	14	13	17	<0.1	8	42	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH09/0.5	0 m	18/03/2021	6	<0.4	8	26	20	<0.1	7	130	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH10/0.1	0 m	18/03/2021	<4	<0.4	15	8	15	<0.1	6	41	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH11/0.1	0 m	18/03/2021	<4	<0.4	14	6	18	<0.1	4	29	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH12/1.0	0 m	18/03/2021	<4	<0.4	12	6	13	<0.1	5	55	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH13/0.5	0 m	19/03/2021	4	<0.4	8	6	24	<0.1	7	64	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300
BH14/1.0	0 m	19/03/2021	5	<0.4	9	7	22	<0.1	6	65	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			300 100	90	300 410	17000 200	600 1100	80	1200 160	30000 470		120	NL 180	NL	300	2800	NL 50	NL 85	NL 70	NL 105	NL 170	0.7	3	300

Lab result

HIL/HSL value EIL/ESL value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Reported naphthalene laboratory result obtained from BTEXN suite

c Criteria applies to DDT only

Site Assessment Criteria (SAC):

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

SAC based on generic land use thresholds for Recreational C including public open space

HIL C Recreational / Open Space (NEPC, 2013)

HSL C Recreational / Open Space (vapour intrusion) (NEPC, 2013)

DC HSL C Direct contact HSL C Recreational /Open space (direct contact) (CRC CARE, 2011)

EIL/ESL UR/POS Urban Residential and Public Open Space (NEPC, 2013)

ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

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Table H2: Summary of Laboratory Results – Phenol, OCP, OPP, PCB, Asbestos

			Phenol	OCP											OPP	PCB	Asbestos		
			Phenol	DDD	DDT+DDE+DDD [c]	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyriphos	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos (60 g)
		PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
Sample ID	Depth	Sample Date	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	-	-	-
BH01/0.1	0 m	15/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH02/0.1	0 m	15/03/2021	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
R1	0 m	15/03/2021	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	-	-	-
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH03/0.1	0 m	15/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH04/1.0	0 m	16/03/2021	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH05/0.1	0 m	16/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH06/1.0	0 m	17/03/2021	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH07/0.1	0 m	17/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH08/1.0	0 m	17/03/2021	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH09/0.5	0 m	18/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH10/0.1	0 m	18/03/2021	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH11/0.1	0 m	18/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH12/1.0	0 m	18/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH13/0.5	0 m	19/03/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			
BH14/1.0	0 m	19/03/2021	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			120	-	400 180	-	180	10	70	20	340	10	10	400	250	-			

Lab result

HIL/HSL value EIL/ESL value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance HSL 0-<1 Exceedance

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DC HSL C Direct contact HSL C Recreational /Open space (direct contact) (CRC CARE, 2011)

EIL/ESL UR/POS Urban Residential and Public Open Space (NEPC, 2013)

ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

Table QA1: Relative Percentage Difference Results – Intra-laboratory Replicates

			Metals								TRH						BTEX				PAH				Phenol	OCP												OPP	PCB	Asbestos		
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Phenol	DDD	DDT+ DDE+DDD [c]	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyrifos	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos (50 g)
Sample ID	Depth	Sample Date	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	mg/kg	mg/kg	mg/kg	-	-	-
R1	0 m	15/03/2021	<4	<0.4	25	9	21	<0.1	8	51	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<1	<0.05	<0.5	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	-	-	-
BH02/0.1	0 m	15/03/2021	<4	<0.4	25	9	20	<0.1	8	49	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
		Difference	0	0	0	0	1	0	0	2	-	-	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		RPD	0%	0%	0%	0%	5%	0%	0%	4%	-	-	-	-	-	-	-	-	-	-	0%	0%	0%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table H3 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, Phenol, OCP, OPP, PCB, Asbestos

			Metals								TRH		BTEX						PAH																Phenol	OCP		OPP	PCB	Asbestos		
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C9	TRH C10 - C14 minus naphthalene (NAP)	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene	Xylene (total)	Benzo (a) pyrene (BaP)	Acenaphthene	Acenaphthylene	Anthracene	Benz (a) anthracene	Benzo (b+j) fluoranthene	Benzo (k) fluoranthene	Benzo (g,h,i) perylene	Chrysene	Dibenz (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-c,d) pyrene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	Phenol	Total chlordane	Total Aldrin+Dieldrin	Total Aldrin+Dieldrin OPP	Total PCBs	Asbestos in soil >0.1g/kg	Trace Asbestos	Total Asbestos
			4	0.4	1	1	1	0.1	1	1	25	50	0.2	0.5	1	2	1	3	0.05	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	5	0.1	0.1	0.1	0.1	-	-	-
Sample ID	Depth	Sample Date	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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	-
BH01-0.1	0 m	15/03/2021	<4	<0.4	20	5	21	<0.1	9	50	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH01-1	1 m	15/03/2021	<4	<0.4	20	5	21	<0.1	9	50	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
QA	0 m	15/03/2021	<4	<0.4	20	5	21	<0.1	9	51	NF	NF	NF	NF	NF	NF	NF	NF	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	NF	NF	NF	NF	NF	NF			
BH02-0.1	0 m	15/03/2021	<4	<0.4	20	5	21	<0.1	9	50	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH02-1	1 m	15/03/2021	<4	<0.4	17	5	20	<0.1	8	72	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH03-0.1	0 m	15/03/2021	<4	<0.4	20	5	21	<0.1	9	50	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH03-1.5	1.5 m	17/03/2021	27	<0.4	9	5	15	<0.1	4	32	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH04-0.1	0 m	17/03/2021	<4	<0.4	14	7	13	<0.1	6	53	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH04-0.5	0.5 m	17/03/2021	<4	<0.4	14	10	17	<0.1	8	62	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH05-0.1	0 m	18/03/2021	<4	<0.4	20	28	26	<0.1	9	82	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH05-0.5	0.5 m	18/03/2021	<4	<0.4	15	8	15	<0.1	8	61	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH10-0.1	0 m	18/03/2021	<4	<0.4	14	6	18	<0.1	4	39	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH02-0.5	0.5 m	15/03/2021	<4	<0.4	16	6	18	<0.1	8	50	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH03-2	2 m	15/03/2021	<4	<0.4	9	5	14	<0.1	5	41	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH10-0.5	0.5 m	18/03/2021	5	<0.4	9	7	22	<0.1	8	85	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
Waste Classification Criteria [1]																																										
CT1			100	20	100	NC	100	4	40	1000	650	10000	10	288	600	NC	NC	1000	0.8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	200	288	50	<50	4	50	NC	NC	NC
SCC1			500	100	1900	NC	1500	50	1050	5000	650	10000	18	518	1080	NC	NC	1296	0.8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	200	288	50	<50	7.2	<50	NC	NC	NC
TCLP1			N/A	N/A	N/A	NC	N/A	N/A	N/A	NC	N/A	N/A	N/A	N/A	N/A	NC	NC	N/A	N/A	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	N/A	N/A	N/A	N/A	N/A	N/A	NC	NC	10
CT2			400	80	400	NC	400	16	160	NC	2600	40000	40	1152	2400	NC	NC	4000	3.2	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	800	1152	240	<50	16	<50	NC	NC	NC
SCC2			2000	400	7600	NC	6000	200	4200	NC	2600	40000	72	2073	4320	NC	NC	7200	25	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	800	2073	432	<50	29	<50	NC	NC	NC
TCLP2			N/A	N/A	N/A	NC	N/A	N/A	N/A	NC	N/A	N/A	N/A	N/A	N/A	NC	NC	N/A	N/A	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	N/A	N/A	N/A	N/A	N/A	N/A	NC	NC	40

CT1 exceedance | TCLP1 and/or SCC1 exceedance | CT2 exceedance | TCLP2 and/or SCC2 exceedance | Asbestos detection

NF = Not f ound NL = Non limiting NC = No criteria NA = Not applicable

Notes:

a QA/QC replicate of sample lised directly below the primary sample

b Total chromium used as initial screen for chromium (VI).

c Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)

d Criteria for scheduled chemicals used as an initial screen

e Criteria for Chlorpyrifos used as initial screen

f All criteria are in the same units as the reported results

PQL Practical quantitation limit

CT1 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste

SCC1 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

TCLP1 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

CT2 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste

SCC2 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

TCLP2 NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Table QA2: Relative Percentage Difference Results – Inter-laboratory Replicates

			Metals								TRH						BTEX				PAH				Phenol	OCP												OPP	PCB	Asbestos		
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10 -C16	TRH >C16 -C34 (F2)	TRH >C10 -C16 less Naphthalene (F2)	TRH >C34 -C40 (F4)	TRH >C16 -C40	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene (N)	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Phenol	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin & Dieldrin	Chlordane (sum)	Dieldrin	Endosulfan (sum)	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyrifos	Total PCB	Asbestos in soil >0.1g/kg	Trace Analysis	Asbestos in soil <0.1g/kg
Sample ID	Depth	Sample Date	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	mg/kg	mg/kg	mg/kg	-	-	-
QN	n/a	13/05/2021	<4	<0.4	<1	<1	<1	<0.1	<1	<1	<25	<50	<100	<50	<100	<100	<0.2	<0.5	<0.5	<1	<1	<0.05	<0.5	<0.05	<0.5	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
BH03-0.1	0 m	13/05/2021	<4	<0.4	20	5	29	<0.1	9	59	<25	<50	<100	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05	58	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
		Difference	0	0	7	3	4	0	0	12	-	-	-	-	-	-	-	-	-	-	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
		RPD	0%	0%	95%	86%	16%	0%	0%	22%	-	-	-	-	-	-	-	-	-	-	0%	0%	0%	0%	95%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	-

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Table QA3: Trip Spike Results – Soils (% Recovery)

Sample ID	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TS1	102	100	103	104	105

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Table QA4: Trip Blank Results - Soils (mg/kg)

Sample ID	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene
TB1	<0.2	<0.5	<1	<1	<2

Appendix I

Quality Assurance and Quality Control

Appendix I
Quality Assurance and Quality Control
Part Lot 1 DP 1263364, Jerrabomberra

I1.0 Field and Laboratory Data Quality Assurance and Quality Control

The field and laboratory data quality assurance and quality control (QA/QC) procedures and results are summarised in the following Table 1. Reference should be made to the field work methodology and the laboratory results / certificates of analysis for further details. The relative percentage difference (RPD) results, along with the other filed QC samples are included in the summary results tables in Appendix H

Table 1: Field and Laboratory Quality Control

Item	Evaluation / Acceptance Criteria	Compliance
Analytical laboratories used	NATA accreditation	C
Holding times	Various based on type of analysis	C
Intra-laboratory replicates	5% of primary samples; <30% RPD	C
Inter-laboratory replicates	5% of primary samples; <30% RPD	C
Trip Spikes	1 per sampling event; 60-140% recovery	C
Trip Blanks	1 per sampling event; <PQL	C
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Matrix Spikes	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Surrogate Spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Control Samples	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Standard Operating Procedures (SOP)	Adopting SOP for all aspects of the sampling field work	C

Notes:
C = compliance; PC = partial compliance; NC = non-compliance

The RPD results were all within the acceptable range.

In summary, the QC data is determined to be of sufficient quality to be considered acceptable for the assessment.

I2.0 Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs) as outlined in NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013):

- Completeness: a measure of the amount of usable data from a data collection activity;
- Comparability: the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness: the confidence (qualitative) of data representativeness of media present on-site;
- Precision: a measure of variability or reproducibility of data; and
- Accuracy: a measure of closeness of the data to the 'true' value.

Table 2: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Systematic and selected target locations sampled.
	Preparation of borehole logs, sample location plan and chain of custody records.
	Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody.
	Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM).
	Completion of chain of custody (COC) documentation.
	NATA accredited laboratory results certificates provided by the laboratory.
	Satisfactory frequency and results for field and laboratory quality control (QC) samples as discussed in Section 1.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project.
	Experienced sampler(s) used.
	Use of NATA registered laboratories, with test methods the same or similar between laboratories.
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled.
	Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs.
	Samples were extracted and analysed within holding times.
	Samples were analysed in accordance with the COC.
Precision	Field staff followed standard operating procedures.
	Acceptable RPD between original samples and replicates.
	Satisfactory results for all other field and laboratory QC samples.
Accuracy	Field staff followed standard operating procedures.
	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been generally complied with.

I3.0 Conclusion

Based on the results of the field QA and field and laboratory QC, and evaluation against the DQIs it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

I4.0 References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

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