Attachment 15: Soil Contamination and Baseline Groundwater Investigation (Douglas & Partners, 2023)

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Soil Contamination and Baseline Groundwater Investigation

Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

Prepared for
Cleanaway Operations Pty Ltd

Project 211616.01
March 2023

Douglas Partners
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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.

	Signature	Date
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Executive Summary

Douglas Partners Pty Ltd (DP) was engaged by Cleanaway Operations Pty Ltd to undertake a soil contamination and baseline groundwater investigation in relation to the construction of a waste-to-energy (WtE) facility (Melbourne Energy and Resource Centre (MERC)) located at 510 Summerhill Road, Wollert.

The scope of works undertaken comprised:

- A desktop review including a review of published geological and hydrogeological maps, historical aerial photographs and information from local / state government authorities
- Intrusive investigation comprising;
    - Excavation of 29 test pits
    - Drilling of 10 boreholes using a hand auger
    - Laboratory analysis of 33 soil samples
    - Installation of three groundwater monitoring wells
    - A single round of groundwater level measurement, sampling and laboratory analysis

The main findings of the investigation included;

- Soil conditions typically comprise a 0.2 m to 2.9 m thick layer (average thickness of 1.0 m) of very stiff and hard, high plasticity, silty clay overlying basalt rock
- Groundwater at the site is present within the Newer Volcanics Basalt at depths of between 0.32 m and 4.23 m below current site surface levels (203.7 - 214.8 m AHD) and is interpreted to be flowing to the south-east.
- The soil and groundwater contamination status established during the investigation indicates that the site is not contaminated and is compatible with the proposed development from a contamination perspective
- The soil and groundwater within the Study Area is unlikely to require remediation and site-specific management
- No specific duties under the Environment Protection Act 2017 Act (including duty to notify) would be invoked by the levels of contaminants identified.

Recommendations for further works include:

- Further sampling and laboratory testing to allow the full categorisation of soils for offsite disposal.
- Following removal of a septic tank, validation sampling of the pit should take place to confirm there is no ongoing risk to human or ecological receptors
- Further groundwater level measurements, sampling and laboratory testing is required to further monitor groundwater quality and to assist in the establishment of appropriate groundwater management measures during construction and in the final condition.

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Abbreviations

Abbreviation	Meaning
AI	Agriculture and Irrigation
APCr	Air Pollution Control residue
ASLP	Australian Standard Leaching Procedure
BGL	Below Ground Level
BREF	Best Available Techniques Reference Document
BTEX	Benzene, Toluene, ethyl benzene and Xylene
C & I	Commercial and Industrial
CHC	Chlorinated Hydrocarbons
CoPC	Contaminants of Potential Concern
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual Site Model
DELWP	Department of Environment, Land, Water and Planning
DLA	Development License Application
DP	Douglas Partners
EIL	Ecological Investigation level
EPA	Victorian Environment Protection Authority
ERS	Environmental Reference Standard
ESO4	Environmental Significance Overlay
ESL	Ecological Screening Level
FZ	Farming Zone
GED	General Environmental Duty
GPS	Global Positioning System
HIL	Human Health Investigation Level
HSL	Health Screening Levels
IBA	Incinerator Bottom Ash
IED	European Industrial Emissions Directive
mAHD	Metres Australian Height Datum
MAH	Monocyclic Aromatic Hydrocarbons
MERC	Melbourne Energy Recovery Centre
MSW	Municipal Solid Waste
OCP	Organochlorine Pesticides

Abbreviation	Meaning
PACM	Potential Asbestos Containing Materials
PAH	Polycyclic Aromatic hydrocarbon
PPN30	Planning Practice Note
PSR	EPA Priority Sites Register
PWS	Potable Water Supply
RCZ1	Rural Conservation Zone
TDS	Total Dissolved Solids
TRH	Total Recoverable Hydrocarbon
VVG	Visualising Victoria's Groundwater
VLR	Victorian Landfill Register
WBR	Water Based Recreation
WDE	Water Dependent Ecosystem
WtE	Waste-to-energy

Report on Soil Contamination and Baseline Groundwater Investigation
Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

1. Introduction

Douglas Partners Pty Ltd (DP) was engaged by Cleanaway Operations Pty Ltd to undertake a soil contamination and baseline groundwater investigation in relation to the proposed Melbourne Energy and Resource Centre (MERC) Project located at 510 Summerhill Road, Wollert (from hereon in referred to as 'the Proposal Area'). The Proposal Area is shown on Drawing 1, Appendix B.

It is understood that the MERC project (The Proposal) will comprise the construction of a waste-to-energy (WtE) facility located at the southern end of the Proposal Area. An overview of The Proposal is provided in Section 2.

The area subject to this investigation (the 'Study Area') is shown on Drawing 1.

DP has previously undertaken a preliminary geotechnical and soil contamination investigation within the Study Area for pre-purchase due diligence purposes (Report ref: 211616.00.R.001.Rev0 dated 18 May 2022). The results of DP's previous assessment have been incorporated into this report.

The purpose of the current investigation is to:

- Provide further investigation of the contamination status of soils within the Study Area and provide baseline groundwater information to support the Development License Application (DLA)
- Assess soil and groundwater contamination levels to the Environmental Reference Standard (ERS) and establish, the need for remediation and management of contaminated soil and groundwater under the planned development to comply with the general environmental duty (GED) of the Environment Protection Act 2017
- Identify any risks to the planned development as a result of soil and groundwater contamination.

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

2. Proposal Overview

Cleanaway Operations Pty Ltd (Cleanaway) is an Australian waste management, recycling, and industrial services company. Cleanaway is developing a waste-to-energy (WtE) facility in Victoria known as the Melbourne Energy and Resource Centre (MERC) (the Proposal).

The MERC has been designed to thermally treat a design capacity of 380,000 tonnes per annum (tpa) of waste feedstock, consisting of residual Municipal Solid Waste (MSW) and residual commercial waste, which is waste that would otherwise be sent to landfill. Waste feedstock processed by the MERC

will be subject to a Waste Acceptance Protocol to determine eligibility and suitability for processing both prior to arrival and upon arrival on-site. The Proposal will also incorporate maturation and processing of bottom ash to recover recyclable metals, with the intent to utilise the remaining ash as an aggregate in construction.

Residual waste is waste that is left over from recycling and resource recovery operations and waste from source separated collections. Source separation involves separating waste into common material streams or categories for separate collection. Waste processed at the site will be subject to a Waste Acceptance Protocol to ensure only appropriate waste is used as feedstock.

The WtE process would generate approximately 46.3MW gross of electricity, 4.7MW of which would be used to power the facility itself and the associated on-site by-product and residue handling processes, with 41.6MW (328,700 MWh/year) exported to the grid as base load electricity. In addition to supplying electricity to the grid, there is also potential to supply energy in the form of heat and/or process steam to local industrial users.

Some residual materials are produced because of the WtE process, including Incinerator Bottom Ash (IBA), boiler ash and flue gas treatment residue. The boiler ash and flue gas treatment residue are typically combined and together are referred to as Air Pollution Control residue (APCr). Overall, the WtE process typically leads to about 90% reduction in the volume, or 80% reduction in mass (tonnes), of waste that would otherwise go to landfill. If IBA is reused as an alternative construction product to virgin materials, this percentage increases further to approximately 95% reduction in volume and mass of waste that would otherwise go to landfill. The final volume of waste diverted from landfill is dependent on the classification and market for the residues and by-products generated by the WtE facility.

The Proposal includes the construction and operation of an IBA maturation and processing facility on site. The purpose of this facility is to store the IBA to mature (stabilise) it, before mechanically processing IBA from the WtE facility into an aggregate for reuse. As part of this process, both ferrous and non-ferrous metals will be recovered from the IBA for recycling and sale to market.

The Proposal also includes a stabilisation facility for APCr, a necessary treatment step to immobilise leachable components of the APCr prior to removal from site by vehicle and disposal at an appropriately licenced landfill.

The Proposal will use best available techniques and technologies in the engineering design, operation, maintenance and monitoring activities associated with the MERC. Moving grate technology has been chosen as the means to thermally treat incoming waste to recover energy and other resources. Current international best-practice techniques, including automated combustion controls and advanced flue gas treatment technology will be applied so that air emissions meet stringent emission standards. The moving grate combustion system is a common form of thermal WtE technology in which the waste is fed through the combustion chamber on a travelling grate. This enables efficient and complete combustion of the waste, with primary combustion air introduced from below the grate and secondary combustion air introduced directly into the combustion zone above the grate. Moving grate technology has been used globally for over 100 years, and in that time the technology has been subject to continual improvement responding to regulatory, industry and public demands. There are approximately 500 similar operational examples across Europe alone, the majority of which use the moving grate-type technology being proposed for the MERC.

The Proposal involves the building of all onsite infrastructure required to support the WtE facility, including site utilities, internal roads, weighbridges, parking and hardstand areas, stormwater infrastructure, fencing and landscaping. The Proposal will also include a visitor and education centre to help educate and inform the community on the circular economy, recycling, resource recovery, the benefits of landfill diversion and the WtE process. The intent behind this education is to drive a shift in community thinking and actions around waste management.

The Victorian Waste to Energy Framework (2021) recognises the role of WtE to divert waste from landfills, helping Victoria transition to a circular economy. *Recycling Victoria* recognises a role for WtE investment and supports WtE facilities where they meet best-practice environment protection requirements. This includes reducing waste to landfill, supporting waste avoidance, reusing and recycling, and demonstrating social license with affected communities. The Victorian Environment Protection Authority (EPA) Energy from Waste Guideline (Publication 1559, 1 July 2017) also notes that efficient recovery of energy from the thermal processing of waste is considered a resource recovery as opposed to a waste disposal option.

The EPA VIC Guideline: Energy from Waste stipulates that *'Proponents of EfW proposals…will be expected to demonstrate that the siting, design, construction and operation of EfW facilities will incorporate best practice measures for the protection of the land, water and air environments as well as for energy efficiency and greenhouse gas emissions management. Facilities should be able to provide evidence of how they minimise and manage emissions (including pollutants, odour, dust, litter, noise and residual waste) in accordance with relevant statutory requirements.*'

The WtE facility has been designed to meet the European Industrial Emissions Directive (IED) (2010) and the associated Best Available Techniques Reference (BREF) Document for Waste Incineration published December 2019, which sets the European Union environmental standards for waste incineration. The facility will also comply with the technical criteria set out in the EPA Victoria Guideline: Energy from Waste publication 1559.1.

The purpose of this specialist assessment is to demonstrate compliance with the various authority requirements, develop community support and social license.

3. State of Knowledge

3.1 Previous Works

The scope of DP's previous work was provided in DP's proposal 211616.00.P.001.Rev0 dated 6 December 2021 and comprised:

- Excavation of 14 test pits to refusal
- Collection of disturbed and undisturbed soil samples
- Laboratory testing of 10 selected soil samples for a broad range of potential contaminants
- Preparation of a combined geotechnical and soil contamination report.

3.2 Current Works

The scope of current work is outlined in DP's proposal 211616.01.P.001.Rev1 dated 9 September 2022 and comprised the following:

Desktop Review

Review of a selection of sources of information including:

- Published geological and hydrogeological maps
- Historical aerial photographs
- Relevant information from local / state government authorities including the EPA Priority Sites Register and other completed Audit Reports in the vicinity of The Project Area.

Intrusive Investigation

To assess portions of the Study Area not accessible during the initial investigation and to fulfil the recommendations of the initial report, DP undertook the following further intrusive testing:

- Drilled 10 shallow boreholes around the existing residential building and surrounding areas
- Collected three potential asbestos containing material (PACM) / cement sheet samples for laboratory analysis for the presence of asbestos fibres
- Excavated 15 test pits to delineate an area of fill identified during DP's initial investigation
- Installation of three groundwater monitoring wells
- A single round of groundwater level measurement and sampling
- Undertake laboratory testing of 23 selected soil samples and three groundwater samples for the identified contaminants of potential concern (CoPC).

Reporting

Following completion of the fieldwork and laboratory analysis, preparation of this report to include data from both investigations including:

- Summary of findings of desktop review
- Summary of soil and groundwater conditions
- Comparison of soil laboratory results to relevant ecological, human health and waste soil categorisation criteria
- Comparison of groundwater results against Environmental Reference Standard (ERS) site specific criteria
- Assessment of potential environmental impacts to the project as a result of soil and groundwater contamination
- Recommendations for further assessment, remediation, or specific soil and / or groundwater management as appropriate.

3.3 Standards and Guidelines

The investigation works were conducted in accordance with the following standards and guidelines:

- EPA Victoria. (2009). Sampling and Analysis of Waters, Wastewaters, Soils and Sludges. Publication IWRG701, June 2009: Environment Protection Authority Victoria, Melbourne, Australia.

EPA Victoria. (2021). *Environment Reference Standard Melbourne Australia.* Victorian Government Gazette, No S 245, 25 May 2021: Victorian Government, Melbourne Australia.

- EPAV (2000), *Groundwater Sampling Guidelines*, Publication 669.1, 2022.
- EPA Victoria. (2021). *Waste disposal categories - characteristics and thresholds.* Publication 1828.2 - March 2021: Environment Protection Authority Victoria
- EPA Victoria. (2021). *Guide to the Environment Reference Standard.* Publication 1992, June 2021: Environment Protection Authority Victoria .

4. Site Description

Proposal Area

The Proposal Area occupies an almost rectangular shaped area of approximately 82ha, located on the northern side of Summerhill Road in Wollert. The location of the Project Area is shown on Drawing 1 in Appendix B. The following is noted:

- The area is surrounded by cleared agricultural land to the north, east and west, and to the south by Summerhill Road and further agricultural land beyond
- The topography was gently undulating with an overall slope down to the south toward Summerhill Road
- At the time of the investigation the Proposal Area was occupied by cleared farmland surfaced with grass. A residential house and associated sheds and outbuildings were located in the central southern area with access to Summerhill Road via a gravel surfaced driveway
- An AusNet transmission line / easement was present in the northeast of the area
- The Proposal Area is currently zoned as Farming Zone (FZ) with a small (<1.0ha) Rural Conservation Zone (RCZ1) and Environmental Significance Overlay (ESO4) located in the north-eastern corner of the Proposal Area.

Study Area

The Study Area (shown on Drawing 1, Appendix B) occupies approximately 60ha of the Proposal Area and excludes areas north of the transmission lines. It is understood that no development will occur within areas to the north of the transmission lines.

Site details provided above for the Proposal Area are also applicable to the Study Area

5. Desktop Investigation

The aims of the desktop investigation were to establish:

- An understanding of expected subsurface and surface conditions across the Study Area
- Assess the current and former uses of the Study Area and surrounding areas
- The potential for soil and groundwater contamination to be present.

5.1 Information Sources

The sources of information reviewed during the desktop investigation are provided in Table 1.

Table 1: Summary of Information Sources

Source	Location of Source	Year / Date of Information Source	Relevant Report Section
Geological Maps	The Geological Survey of Victoria	1:63 360 scale, Sunbury Map	5.2
Topographic Maps	Vicmap Database	1:25 000 Elevation	
Acid Sulfate Soil Maps	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Atlas of Australian Acid Sulfate Soils	
Surface Water and Hydrogeology	Federation University Australia's Visualising Victoria's Groundwater (VVG) website	Federation University, 2005	5.3
Aerial Photographs	Department of Environment, Land, Water and Planning (DELWP), Google Earth and Metromap	1963, 1972, 1984, 1991, 2002, 2009, 2022	5.4
Priority Sites Register search	EPA Victoria (EPA)	31 July 2022	5.5
List of Certificates and Statements of Environmental Audit	EPA/Victoria Unearthed	Current	5.6
EPA Licensed Sites Register	EPA/Victoria Unearthed	Current	5.7

Source	Location of Source	Year / Date of Information Source	Relevant Report Section
EPA Victorian Landfill Register	EPA/Victoria Unearthed	Current	5.8
Streamology	Provided by client	2022	5.3

An integrity assessment of the information reviewed is provided in Section 5.9, and a summary of the desktop review is presented in Section 5.10.

5.2 Geology and Topography

The Geological Survey of Victoria 1:63,360 scale, Yan Yean and Sunbury maps, indicates the site surface geological unit to be Quaternary Age 'Newer Volcanics' basalt. Based on DP's previous investigation within the Study Area, the subsurface profile is expected to comprise high plasticity clays between 0.5m and 3.0m thick over variably weathered, but typically high strength basalt rock. Basalt floaters often occur within the clay profile above the rock head. The depth to basalt can be highly variable and can often change significantly over short distances.

DP further notes that the published maps also indicates that inliers of the Melbourne Formation (Silurian Age siltstone and sandstone) are present within areas to the west and north-west of the site.

Based on a review of topographical maps, surface levels of the study Area vary between 224 mAHD in the north-eastern to 208 mAHD the south-east and generally slopes downward in a south-westerly direction from the north-eastern corner and alters to south to south-easterly direction across the south of the Study Area.

Published Atlas of Australian Acid Sulfate Soils mapping, compiled by the CSIRO indicates that the Study Area as an extremely low and low probability of acid sulfate soils occurring.

5.3 Surface Water and Hydrogeology

Surface water features within the Study Area include two ephemeral waterways and three small farm dams. The waterways include Tributary 4545 (Streamology 2022) which intersects the south-western corner of the Study Area and flows in a north to south direction and a tributary of the Curly Sedge Creek which, intersects the south-east corner of the Study Area and flows in a south-easterly direction. Nearby surface water bodies, outside of the Study Area, include nearby farm dams and Merri Creek which is situated approximately 730m west of site.

A search of the VVG website (http://www.vvg.org.au/) indicates that groundwater depths vary between 5m and 20m below ground level. The website further indicates groundwater salinity (reported as total dissolved solids (TDS) in the range of 1,000mg/L and 3,500mg/L. This would place site groundwater within Segment B of the groundwater environment under the ERS. However, based on the groundwater laboratory results for the current investigation (see Section 10.2.3), which reported salinity values in the range of 260 - 320mg/L, site groundwater would be within Segment A1 in accordance with the ERS.

Further discussion regarding the implications and assessment of Segment A1 groundwater is provided in Appendix G.

5.4 Aerial Photographs

Copies of the relevant aerial photographs are presented in Appendix C. The information gathered from the review of aerial photographs was limited to identification of macro evidence depicted on the photographs. A summary of observations based on the aerial photograph review for the site is presented in Table 2.

Table 2: Summary of Historical Aerial Photographs

Year	Site	Surrounding Land Use
1963	The site appeared to be vacant and formed a portion of a larger agricultural site. Areas of rock outcrop were visible across the site. Some subdivision of paddocks was visible in the south of the site.	Comprised cleared farmland. Isolated farm or residential buildings were visible to the west of site along Summerhill Road (unpaved), as well as some unpaved vehicle tracks. The Merri Creek was visible to the west.
1972	Overhead powerlines were constructed in the northern half of the site in a south-east / north-west direction. The southern portion of the site was divided up into three paddocks and included small dams in two of those. A third dam was visible in the centre of the site. A minor water course appeared to intersect the south-western corner of site.	Residential and farm buildings were noted in the eastern and southern neighbouring properties as well as a dam to the east of site. The major overhead powerlines on site extended into neighbouring properties in a south-east / north-west direction.
1984	An additional row of powerlines was constructed alongside the original.	An additional row of powerlines was constructed alongside the original. No other visible significant changes were noted.
1991	No visible significant changes were noted on site.	A new residential dwelling was constructed to the north-west of site. Earthworks activities were noted south-west of the site and these are expected to be associated with a quarry within the Austral Bricks facility based on prior work by DP there.
2002	A residential dwelling and associated farm buildings were constructed in the centre of site. The southern portion of the site appeared to have been divided into four paddocks.	Some additional residential and farm buildings were constructed in the western neighbouring properties. Two water storage facilities were visible within the quarrying area.
2009	Evidence of potential filling was noted in the south-eastern portion of the site as shown by patchy vegetation and a pale brown	Evidence of potential filling, of similar nature to that on the subject site, was noted in the western neighbouring property adjoining the driveway to the dwelling. No

Year	Site	Surrounding Land Use
	colour, generally inconsistent with the expected localised geology.	other visible significant changes were noted.
2022	Vegetation had mostly grown back over the disturbed area of soil, though the approximate outline was still partially visible. No other visible significant changes were noted.	No visible significant changes noted.

5.5 Priority Sites Register

The EPA priority sites register (PSR) provides a list of sites that have an EPA Clean-Up Notice, or Pollution Abatement Notice (pursuant to Section 62A and Section 31A or 31B of the Environment Protection Act 1970 respectively), or an Improvement Notice, Prohibition Notice, Environment Action Notice or Site Management Order (pursuant to Sections 271, 272, 274 and 275 of the Environment Protection Act 2017 respectively) issued for them. A review of the most recent PSR (31 July 2022) for a 500m radius around the site, found that neither the site nor surrounding sites are present on this list.

5.6 Certificates and Statements of Environmental Audit

Publicly available Audit reports provide information relating to potentially contaminated sites and detail investigation and, in some cases, remediation and / or management of the site required to render the site suitable for a particular use. Review of Audit reports is useful when considering any potential impacts from the Audit site on the subject site and assessing local groundwater conditions.

Based on a review of the List of Certificates and Statements of Environmental Audit held by EPA, as of 31 July 2022, no Environmental Audits have been undertaken within 2 km of the subject site.

5.7 EPA Victoria Licensed Sites

The EPAV and Victoria Unearthed websites provide a public list of sites licensed to perform particular activities that may present an environmental risk. One active Development License and one active Operating License were identified at Austral Bricks situated approximately 800m south-west of the Proposal Area including:

- Development License no. PRM001194: A03 (Sewage Treatment)
- Operating License no. OL000011517: H03 (Ceramics) which *'permits the discharge of waste from a premises where bricks are made from clay extracted on the premises. Annual production capacity is approximately 500,000 tonnes. Wastes discharged from the premises include nitrogen oxides, carbon monoxide, particles and acid gases (chlorides, sulfur dioxide and fluorides)'*.

DP does not consider either of these uses to pose a significant contaminative risk to the site.

5.8 EPA Victorian Landfill Register

The Victorian Landfill Register (VLR) is a public database providing information, where available, on the known attributes of landfills including type, volume, waste accepted and year of closure. The Victoria Unearthed website provides information via an interactive map on the VLR. DP performed a search of Victoria Unearthed and identified one nearby closed landfill as follows:

- 600 Craigieburn Road, Wollert - Landfill Register no. *10509*
- The landfill was listed as being owned by Pioneer Building Products and accepted solid inert waste, prior to being closed in 1998. No further information was provided. The area is situated approximately 350m south, hydrogeologically down-gradient of the subject site.

5.9 Desktop Integrity Assessment

The information reviewed as part of the desktop investigation was sourced from reputable and reliable reference documents, many of which were official records held by Government departments/agencies. The databases maintained by various Government agencies potentially can contain high quality information, but some of these do not contain any data at all.

In particular, aerial photographs provide high quality information that is generally independent of memory or documentation. They are only available at intervals of several years, so some gaps exist in the information from this source. The observed site features are open to different interpretations and can be affected by the time of day and/or year at which they were taken, as well as specific events such as flooding. Care has been taken to consider different possible interpretations of aerial photographs and to consider them in conjunction with other lines of evidence.

5.10 Summary of Desktop Review

The following summary is based on a review of information sources presented above.

- The study area is underlain by the Quaternary Age ‘Newer Volcanics’ comprising basalt with groundwater expected to be within the basalt at depths of between 5m and 20m below surface levels
- Surface levels vary between approximately 224 mAHD and 208 mAHD and slope downward in a south-westerly, south and south-easterly direction
- Surface water features include two ephemeral streams and three farm dams
- The Study Area has comprised agricultural land from at least 1963. The site was vacant until between 1991 and 2002 when the current house and associated buildings were constructed
- Major overhead powerlines were constructed in an easement through the north-eastern portion of the Study Area sometime between 1963 and 1972. The lines were duplicated prior to 1984
- Evidence of the historic placement of fill was noted in the south-eastern corner of the area in the 2009 aerial photograph. This was confirmed during DP’s initial investigation undertaken during January 2022
- Surrounding land use typically comprised agricultural, with the exception of the Austral Bricks facility located on the southern side of Summerhill Road where quarrying activities were taking place for brick making. A quarry is also present to the north of the Study Area

- One EPA Licensed Site (Austral Bricks) was identified within 2km of the Proposal Area and included a former solid inert waste landfill which was closed in 1998, However, this site is considered to be located down-hydraulic gradient of the Proposal Area and is considered to represent a low risk of contamination to the Proposal and Study Area. No indication of any remedial or closure procedures were noted.

6. Site Walkover

A walkover of the Study Area was undertaken by an environmental scientist from DP on 13 September 2022 to observe site surface conditions. The site topography was noted to be generally consistent with that described in Section 5.2 and the site conditions appeared consistent with those observed in the most recent aerial photograph 2022) reviewed during the desktop Investigation.

With reference to Drawings 1, 2 & 3 and photographs in Appendix B, the following site features were noted:

- The Study Area was being utilised for cattle grazing
- Two brick residential buildings and associated steel sheds (empty) were present
- A concrete slab with evidence of minor filling, indicative of a former building, was noted north of the main shed, located adjacent to a crushed rock vehicle parking area
- An area which appeared to have been excavated and used as a burn-off area was identified north-east of the residential buildings. Minor amounts of burnt wood was present overlying scoria gravel
- A septic tank was located to the west of the main residential building
- A small stockpile (Approx. 10 m^3) was noted south-west of the main shed
- PACM in the form of cement sheet fragments were identified at three locations
- The potential placement of Fill was identified around the main house and appeared to comprise locally sourced soil
- Three small farm dams were present on site
- A large area of fill was identified in the south-eastern area
- Surrounding land use adjoining the site comprised agricultural and residential.

With the exception of identified areas of fill and several potential point sources of contamination (*ie* soil stockpile, septic tank and PACMs) no obvious signs of significant contamination (*ie* stained or odorous soils) or sources of contamination (*ie* areas of current or historic bulk chemical / fuel storage or manufacturing / processing) were identified within the Study Area. Furthermore, no potential contamination sources were identified within areas immediately adjoining the Study Area.

7. Potential for Contamination

Based on the results of the desktop investigation and walkover inspection, the potential for the presence of widespread soil and groundwater contamination across the broader Study Area is considered to be low.

However, with reference to Table 2 of the DELWP Planning Practice Note (PPN30), a medium potential for contamination is considered to be present:

- Across areas where fill has been identified, including areas in the south-east of the Study Area and around existing buildings
- Where point sources of potential contamination have been identified including;
  - The septic tank
  - Cement sheet fragments
  - Soil stockpile
  - Burn off area.

Considering the nature of sources identified as being of medium potential for contamination, near surface soils and fill are considered be at highest risk of being impacted. Exception to this is noted for the septic tank, where deeper soils could potentially be impacted.

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 potential receptors may be exposed to the identified contamination sources either in the present or the future. It enables an assessment of the potential source – pathway – receptor linkages (complete pathways). The CSM presented below has been developed based on the findings of the desktop investigation and walkover inspection.

Potential Sources

Based on the available information, the following potential sources of contamination and associated contaminants of potential concern (CoPC) have been identified.

- S1: Fill: In south-east corner of site and around site buildings.
  - CoPC include metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), and asbestos.
- S2: Septic Tanks.
  - CoPC include nutrients and metals (*arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin and zinc)*.
- S3: Cement sheet fragments.
  - CoPC include asbestos.

- S4: Soil stockpile.
  - CoPC include metals (as above), TRH and PAH.
- S5: Burn-off area.
  - CoPC include metals (as above), TRH and PAH.

Potential Receptors

The following potential human receptors have been identified:

- R1: Current users [tenants]
- R2: Construction and maintenance workers
- R3: End users [MERC workers]
- R4: Adjacent site users [residential / agricultural].

The following potential environmental receptors have been identified:

- R5: Surface water [western ephemeral creek]
- R6: Groundwater
- R7: Terrestrial and aquatic 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: Leaching of contaminants and vertical migration into groundwater
- P5: Lateral migration of groundwater providing base flow to water bodies
- P6: Contact with terrestrial and aquatic 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 via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S5) and receptors (R1 to R7) are provided in Table 3.

Table 3: Summary of Potentially Complete Exposure Pathways

Source and CoPC	Transport Pathway	Receptor
S1: Imported Fill: Metals, TRH, BTEX, PAH and asbestos	P1: Ingestion and dermal contact P2: Inhalation of dust and / or vapours P3: Surface water run-off P4: Leaching of contaminants and vertical migration into groundwater P5: Lateral migration of groundwater providing base flow to water bodies P6: Contact with terrestrial and aquatic organisms	R1: Current users [tenants] R2: Construction and maintenance workers R3: End users [MERC workers] R6: Groundwater R7: Terrestrial and aquatic Ecology
S2: Septic Tanks: Nutrients and metals	P1: Ingestion and dermal contact P3: Surface water run-off P4: Leaching of contaminants and vertical migration into groundwater P5: Lateral migration of groundwater providing base flow to water bodies P6: Contact with terrestrial and aquatic ecology	R1: Current users [tenants] R2: Construction and maintenance workers R3: End users [MERC workers] R5: Surface Water R6: Groundwater R7: Terrestrial and aquatic Ecology
S3: PACM Fragments: Asbestos	P1: Ingestion and dermal contact P2: Inhalation of dust P3: Surface water run-off	R1: Current users [tenants] R2: Construction and maintenance workers R3: End users [resource recovery centre workers]
S4: Small stockpile: Metals, TRH and PAH	P1: Ingestion and dermal contact P2: Inhalation of dust and / or vapours P3: Surface water run-off P4: Leaching of contaminants and vertical migration into groundwater P5: Lateral migration of groundwater providing base flow to water bodies P6: Contact with terrestrial and aquatic ecology	R1: Current users [tenants] R2: Construction and maintenance workers R3: End users [MERC workers] R6: Groundwater R7: Terrestrial and aquatic Ecology
S5: Burn-off area: Metals, TRH and PAH	P1: Ingestion and dermal contact P2: Inhalation of dust and / or vapours P3: Surface water run-off P4: Leaching of contaminants and vertical migration into groundwater P5: Lateral migration of groundwater providing base flow to water bodies P6: Contact with terrestrial and aquatic ecology	R1: Current users [tenants] R2: Construction and maintenance workers R3: End users [MERC workers] R6: Groundwater R7: Terrestrial and aquatic Ecology

9. Field Work Investigation

9.1 Methodology and Sampling Rationale

The field work over both phases of investigation comprised the excavation of 29 test pits, drilling of 10 boreholes and installation and sampling of three groundwater monitoring wells. All test locations are shown on Drawings 2 and 3, Appendix B. Site photographs are also provided in Appendix B.

A summary of all sampling locations and their targets is provided in Table 4.

All test locations were recorded using a differential GPS device to MGA94 Zone 55H datum, and elevations were recorded to mAHD. The field work was undertaken by an Environmental Scientist / Geologist who set out the test locations, supervised the test pit excavations and borehole drilling, logged the subsurface conditions, and collected soil samples for subsequent laboratory analysis.

9.1.1 Test Pit Investigation

The test pit investigation was undertaken in two phases of works and comprised the excavation of 14 test pits on 24 January and a further 15 test pits on 14 September 2022.

All test pits were excavated using either a 13 tonne or 16 tonne excavator equipped with a 450mm wide rock bucket.

The test pits targeted general soil conditions across the broader Study Area in addition to the area of fill in the south-east of the Study Area identified from the desktop review, walkover inspection and CSM.

In each test pit, the soil profile was logged, and disturbed environmental soil samples were collected at selected depths throughout the soil profile. The samples were collected either directly from the walls of the pits or from the centre of the excavator bucket to minimise the potential for cross contamination. All samples were collected into laboratory supplied jars using a clean fresh pair of nitrile gloves between each sampling point.

9.1.2 Borehole Investigation

The borehole investigation was undertaken on 13 September 2022 and comprised the drilling of 10 boreholes (HA01 - HA10) to depths of between 0.2m and 1.1m using a 100mm diameter hand auger.

All boreholes targeted areas surrounding the existing residential building and associated outbuildings and infrastructure and included potential sources of contamination identified from the desktop investigation, walkover inspection and CSM.

In each borehole, samples were collected directly from the auger head at various depths throughout the soil profile The auger head was cleaned between each sampling point using a solution of phosphate free detergent (Decon90) and tap water solution, then rinsed with deionised water. All environmental samples were collected using a new pair of nitrile gloves between sampling points and samples were placed into laboratory supplied jars minimising air space within the container. All samples were labelled with individual identification details and sent to a National Association of Testing Authorities (NATA) approved laboratory under chain of custody documentation for subsequent testing of selected samples.

9.1.3 Stockpile Sampling

Three samples were collected from the soil stockpile identified adjacent to the shed using hand tools.

The samples were collected from various depths throughout the stockpile and placed into laboratory supplied jars using a fresh pair of nitrile gloves for each sample. The samples collected are considered to be representative of the soil contained in the stockpile.

9.1.4 Asbestos

Samples of cement sheet fragments were collected from the site surface at three locations.

Table 4: Summary of Test / Sampling Location and Targets

Date	Location	Target / Aim	Target Contamination Source (S*)
Test Pits			
24 Jan 2022	TP01 - TP12	Establish subsurface conditions across the broader Study Area.	-
	TP13 & TP14	Further characterise area of fill identified in the south-east of the Study Area.	S1
14 September 2022	TP15, TP15A, TP16, TP16A, TP17, TP17A, TP18, TP19, TP19A, TP20, TP21, TP22, TP23, TP23A, TP24	Characterise and delineate area of fill identified in the south-east of the Study Area site.	S1
Boreholes			
14 September 2022	HA02 - HA07 & HA09	Establish subsurface conditions across areas within and surrounding the house and associated outbuildings.	S1
	HA08	Septic Tank	S2
	HA01	Burn off Area	S5
Stockpile			
14 September 2022	SP1, SP2 and SP3	Soil Stockpile	S4
Asbestos			
14 September 2022	PACM1, PACM2 & PACM3	Cement Sheet fragments at site surface	S3

*As per Section 8 and Table 3.

9.1.5 Groundwater Well Installation and Sampling

The three groundwater wells were drilled and constructed on 13 September 2022 using a track mounted drill rig. The wells were drilled to depths of between 5m and 8m using a 100mm diameter solid flight auger in the soil profile and a pneumatic hammer in the rock profile. Well construction details are provided on the borehole logs in Appendix D.

Following construction, the wells were developed by removing a minimum of three well volumes of water using a disposable hand bailer.

On 21 September 2022, water levels in the wells were measured. A summary of the measured water levels is provided in Section 9.2.4.

The wells were then purged by the removal of three well volumes. Following sufficient recharge, groundwater samples were collected into laboratory supplied containers using a hand bailer. A new bailer was used for each well.

9.1.6 Quality Assurance and Control Sampling

Details of the Quality Assurance Program undertaken by DP as part of this investigation are presented in Appendix H. In summary, the accuracy and precision of the soil and groundwater testing procedures for this assessment are considered by DP to be of sufficient standard to allow the data reported by the nominated laboratory to be used for interpretation of the encountered site contamination conditions.

Quality control samples collected in the field included:

- An intra-laboratory duplicate soil sample collected from TP15
- An inter-laboratory duplicate soil sample collected from TP15
- An intra-laboratory duplicate groundwater sample from MW2.

9.2 Field Work Results

Details of the conditions encountered in the test pits and boreholes are presented on the logs provided in Appendix D. These should be read in conjunction with the notes ‘About this Report’ and other explanatory notes, contained in Appendix A.

9.2.1 Test Pits

TP01 - TP14 (24 January 2022)

The subsurface conditions encountered in test pits TP01 - TP14 generally consisted of a 0.3m to 2.9m thick layer (average thickness of 1.0m) of very stiff and hard, high plasticity, residual silty clay overlying basalt rock. At all locations, the test pits refused on basalt at depths of between 0.3m and 3.8m (average refusal depth of 1.4m). It is noted that basalt rock outcrops were identified at multiple locations across the site.

A fill layer overlying the natural soil profile was encountered in the southeast area of the Study Area as follows:

- At test pit locations, TP01, TP13 and TP14, a fill thickness of 2.3m, 1.9m and 0.9m was encountered respectively and comprised gravelly clay with basalt and siltstone cobbles
- At TP2, the fill was 0.5m thick and comprised gravelly clay.

Although the depth to basalt was variable across the site, rock depths typically increased from north to south with the deepest rock depths (*i.e.* those exceeding the average depth to rock of 1.4m) encountered in test pits TP1, TP2, TP9, TP13 and TP14.

TP15 - TP24 (14 September 2022)

Test pitting was undertaken to delineate the fill identified in TP01, TP13, and TP14 and the aerial photograph review undertaken as part of the desktop investigation (see Section 5.4). The test pits targeted the perimeter and internal areas of the fill.

The fill was intercepted in 12 of the pits and typically comprised medium to high plasticity pale grey, brown and yellow clays with frequent inclusions of subangular siltstone gravels. Trace amounts of brick fragments were encountered at TP23, TP23A and TP19. Minor inclusions of scrap metal, plastic and granitic gravel were identified in TP23 at 0.7m. Fill thickness varied from 0.1m to 1.7m. Fill was not encountered in pits TP15A, TP17A and TP19A. The established perimeter of the fill is shown on Drawings 1 and 2, Appendix B.

The natural soil profile encountered in the pits typically comprised high plasticity, residual silty clay derived from the weathering of the basalt.

No malodorous or stained soil was identified in any of the test pits.

9.2.2 Boreholes

Ten hand auger boreholes were drilled within the vicinity of the residential buildings. The boreholes were drilled to depths of between 0.2m to 1.1m below ground level. All boreholes refused on basalt.

With the exception of boreholes HA03 and HA05, the soil profile in all boreholes comprised entirely fill to the termination depths of between 0.2m and 0.35m below site surface levels. In borehole HA03, the soil profile comprised a 0.7m thick layer of fill overlying residual clays to termination at 1.1m and in HA05 the soil profile comprised entirely residual clay to refusal at depth of 0.5m.

The fill encountered in HA04, HA06, HA07, HA08 comprised of reworked residual clay. Elsewhere the fill comprised sandy gravels and gravelly clay or clayey gravel, typically with inclusions of subangular basaltic gravels (crushed rock) and fine to coarse sand. Trace amounts of brick fragments were identified in HA03, HA06 and HA09.

No malodorous or stained soil was identified in any of the boreholes.

9.2.3 Stockpile

The soils contained within the stockpile comprised gravelly clay and were considered to comprise reworked local soils. No signs of potential soil contamination were noted.

9.2.4 Groundwater Wells

The subsurface conditions encountered in the groundwater wells, MW1, MW2 and MW3 comprised a 0.2m, 1.0m and 0.6m thick layer of natural residual clays overlying basalt. The basalt was typically slightly weathered with moderately and highly weathered zones.

A summary of the groundwater observations during drilling, and water levels measured in the installed wells is provided in Table 5. No obvious signs of potential contamination including the presence of odour, stains or sheens were noted during the drilling and installation or development and sampling in any well.

Table 5: Summary of Groundwater SWLs

Well ID	Water Observations During Drilling	Screened Interval	Measured Standing Water Level*		Groundwater Sample Observations
		m BGL	m BGL	m AHD	
MW1	Groundwater observed below 7 m	5 - 8	1.25	214.84	Grey-brown silty, no odour
MW2	Groundwater observed below 6.5 m	4 - 7	4.23	203.73	Red-brown silty, no odour
MW3	Groundwater observed below 3.5 m	2 - 5	0.32	207.79	Grey-brown silty, no odour

*Water levels were measured from the top of the well casing, with depth to groundwater below ground level (BGL) calculated from the survey results.

The groundwater levels measured in the wells and the results of the GPS surface level measurements, indicated a south-east groundwater flow direction. However, it should be noted that groundwater levels can vary due to seasonal fluctuations, climatic effects and other anthropogenic factors.

10. Laboratory Testing

10.1 Analytical Suites

10.1.1 Soil

A summary of the soil laboratory analysis is provided in Table 6.

Table 6: Summary of Soil Analytical Program

No. of Samples Analysed		Laboratory Analysis Program
Initial Investigation	Current Investigation	
Boreholes and Test Pits		
2 Fill	2 Fill	Metals *(arsenic, cadmium, chromium (VI), copper, lead, mercury, molybdenum, nickel, tin, selenium, silver and zinc)*, total cyanide, total fluoride, speciated phenols (halogenated and non-halogenated), monocyclic aromatic hydrocarbons (MAH - including benzene, toluene, ethyl benzene, xylenes and naphthalene known as BTEXN), polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH), polychlorinated biphenyls (PCB), chlorinated hydrocarbons (CHC - volatile and semi-volatile), organochlorine pesticides (OCP) and pH.
1 Natural	None	
7 Natural	17 Fill	Metals (*arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin and zinc*), TRH, BTEXN and PAH
None	1 Natural	
Stockpile Samples		
3		Metals (*arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin and zinc*), TRH, and PAH
Quality Control Samples		
None	1 Inter-laboratory Duplicate	Metals (*arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin and zinc*), TRH, and PAH
	1 Intra-Laboratory Duplicate	

The analytical suite adopted is considered to adequately cover the CoPC identified from the desktop review, walkover inspection and CSM. It is further noted that the laboratory analysis has focussed on surface soils and fill, in accordance with the findings of the desktop review and the identified potential for contamination (see Section 7). This has resulted in the majority of samples analysed comprising fill.

10.1.2 Asbestos

Three samples of PACM cement sheeting were analysed during the current investigation for asbestos (presence / absence). The samples were collected from the site surface at locations shown on Drawing 2 & 3, Appendix B.

10.1.3 Groundwater

Three primary groundwater samples and one intra-laboratory duplicate sample were analysed during the current investigation for:

- pH, Total Dissolved Solids, Electrical Conductivity, major cations and anions, TRH, BTEX, Naphthalene, CHC, OCP, metals (filtered, as per above but with total chromium), ammonia, nitrate, nitrite and total nitrogen.

No rinsate sample was collected as a fresh disposable bailer was used at each sample location, and no trip blanks were collected as the potential for the presence of volatile contaminants was considered to be low.

The analytical suite adopted was intended to represent indicative water quality and cover a broad range of commonly encountered groundwater contaminants including the CoPC identified from the desktop review and CSM.

10.2 Laboratory Results

Tabulated laboratory results for the soil (from the current and previous investigations) and groundwater samples together with relevant assessment criteria, are provided in Tables E1 to E4 in Appendix E.

The NATA-endorsed laboratory certificates of analysis and chain of custody documentation are provided in Appendix F.

10.2.1 Soil

The soil laboratory results have been compared to the following criteria:

- Human Health Investigation Levels applicable to a commercial / Industrial land use (HIL D)
- Health Screening levels (Vapour intrusion) applicable to fine textured soils within a commercial / Industrial land use (HSL D)
- Management levels
- Ecological Investigation Levels applicable to a commercial / industrial land use (EIL)
- Ecological Screening Levels applicable to a commercial / industrial land use (ESL)
- EPA waste categorisation criteria.

Further details on the adopted assessment criteria are provided in Appendix G.

10.2.1.1 Human Health Criteria (HIL / HSL)

With reference to Tables E1 and E2, all 32 primary soil samples (fill and natural) analysed over both phases of investigation recorded contaminant concentrations below the adopted HIL (D) and HSL (D) criteria.

10.2.1.2 Ecological Screening Levels

With reference to Table E1, no exceedance of adopted Ecological Investigation Criteria (EILs) were recorded.

10.2.1.3 Soil Hazard Characterisation

With reference to Table E3, four of the 32 samples analysed recorded concentrations of nickel above the upper limits for Fill Material (60 mg/kg) within the range of Category D Contaminated Soil.
All four samples comprised fill as follows:

- Sample HA01-0.0 which was collected from within basaltic gravel fill within a burn-off area recorded nickel concentrations of 170 mg/kg
- Sample HA03-0.0 which was collected from within basaltic gravel fill at the vehicle entrance to the shed recorded nickel concentrations of 85 mg/kg
- Samples TP19-1.0 and TP20-0.05 both of which were collected from within the fill area located in the south-eastern portion of the site reported nickel concentrations of 67 mg/kg and 73 mg/kg respectively.

Leachability (ASLP) testing undertaken on samples HA01-0.0 and TP20-0.05 recorded leachable nickel concentrations in the range of Fill Material, indicating the nickel is at low risk of becoming mobile.

No exceedances of the Fill Material criteria were reported in the natural soil.

10.2.2 Asbestos

No asbestos was detected in any of the cement sheet samples analysed.

10.2.3 Groundwater

Tabulated groundwater laboratory results and adopted assessment criteria are provided in Table E4, Appendix E.

10.2.3.1 Groundwater Quality

Laboratory determined groundwater quality parameters (pH, TDS, chloride and sulfate) are summarised in Table 7.

Table 7: Summary of Laboratory Results for Groundwater Quality

Monitoring Well	pH	TDS	Chloride	Sulfate
		(mg/L)		
MW1	7.0	320	47	18
MW2	6.5	330	57	35
MW3	6.5	260	30	30

The laboratory results generally indicate neutral to slightly acidic conditions with pH values ranging between 6.5 and 7.0. Recorded TDS concentrations (260 mg/L to 330 mg/L) indicated low salinity conditions across the three monitoring wells.

10.2.3.2 Environmental Values

Laboratory analysis results for the groundwater samples were compared to the adopted Environmental Values criteria. The laboratory results recorded concentrations of metals (copper and zinc), and total nitrogen above adopted Water Dependent Ecosystem (WDE) criteria.

A summary of recorded exceedances of criteria are summarised in Table 8.

Table 8: Summary of Groundwater Ecosystems Criteria Exceedances

Analyte	Concentration Range	Adopted Criteria	Recorded Exceedances
	(µg/L)	(µg/L)	
Water Dependent Ecosystems (WDE) - 95% Protection			
Copper	3 - 46	1.4	All wells
Zinc	15 - 85	8	All wells
Total Nitrogen (N)	1,100 - 2,000	1,300*	MW3

*75th percentile value

11. Discussion

11.1 Planned Development

It is understood that the MERC project will comprise the construction of a WtE facility to treat municipal and commercial / industrial waste. The area of development subject to the DLA will be restricted to the southern end of the site and include:

- IBA treatment (sorting and maturing) building
- Air Pollution Control Residue Stabilising building
- Waste sorting facility (including waste hall / bunker) and boiler / thermal treatment building

- Substation building
- A visitor centre
- Admin building
- Attenuation ponds
- Car and truck parking areas
- Fire water tank farm
- Associated access roads.

11.2 Soil

The soil conditions across the Study Area have been assessed via the investigation of soil conditions at 39 locations (29 test pits and 10 boreholes) and the laboratory analysis of 32 soil samples. Although based on the size of the Study Area (approx. 60ha) the number of soil sampling locations does not comply with AS4482.1 for a detailed site investigation, the sampling locations undertaken have targeted all identified areas of concern established from the desktop investigation, walkover inspection and CSM, in addition to characterising the broader site area. As such, it is considered that the scope of intrusive and laboratory testing is sufficient to adequately characterise the site soil contamination conditions within respect to the proposed industrial / commercial development.

11.2.1 Soil Conditions

Soil conditions at the site typically comprise a 0.2 m to 2.9 m thick layer (average thickness of 1.0 m) of very stiff and hard, high plasticity, silty clay overlying basalt rock.

Exception to this is noted in the south-east area of the site where up to 2.3 m of imported fill was located, and in the vicinity of the existing site buildings where between 0.2 m and 0.7 m of fill (predominantly comprising reworked natural soil) was encountered.

11.2.2 Soil Contamination

11.2.2.1 Human Health Risks

All recorded contaminant concentrations were below the adopted human health criteria (HIL and HSL) considered to be applicable to the proposed commercial / industrial development. As such, the site soils are not considered to pose an unacceptable risk to human health under the proposed development and land use.

11.2.2.2 Ecological Risks

All recorded contaminant concentrations were below the adopted EIL considered to be applicable to the proposed commercial / industrial land use. As such, the site soils are not considered to pose an unacceptable risk to terrestrial ecosystems under the proposed development and land use.

11.2.2.3 Aesthetic Considerations

Aesthetic impacts identified in soil included trace amounts of one or more of brick, metal or plastic fragments within fill at some locations.

These aesthetic issues are not considered to affect the proposed development which will represent a non-sensitive (industrial) land use. Furthermore, it is likely that these soils will be removed from site during construction due to being geotechnically unsuitable.

11.2.2.4 Preliminary Waste Soil Disposal Categorisation

The waste soil disposal categorisation provided below should be considered as preliminary in nature and would be subject to further testing based on the volumes of soils requiring offsite disposal. Further testing should be done in accordance with EPA publications IWRG702 and 1828.2.

Fill

Although four of the 21 samples of fill analysed recorded nickel concentrations within the range of Category D contaminated soil, statistical analysis of the entire data set and calculation of the 95% upper confidence level of the mean (95% UCL) for nickel (50 mg/kg) is below the Fill Material upper limit for nickel of 60 mg/kg. As such, it is considered likely that all site fill will be able to be categorised as Fill material for offsite disposal purposes.

The area of imported fill identified in the south-east of the site is represented by 10 samples, two of which recorded nickel concentrations within the range of Category D Contaminated Soil. Calculation of the 95% UCL for nickel using the 10 samples representative of the imported fill resulted in a 95% UCL value of 45 mg/kg which is below the Fill Material upper limit of 60 mg/kg. As such, the imported fill would be categorised as Fill Material for offsite disposal purposes.

Natural

Based on the laboratory results from the eight samples of natural soil analysed, the natural site soils would be categorised as **Fill Material** for offsite disposal purposes.

Although further sampling and laboratory testing at an appropriate sample density to offsite disposal volume (approx. one sample per 250 m^3) would be required to provide full waste categorisation for natural soil it is anticipated that any natural site soils requiring disposal will be able to be categorised as Fill Material. This is based on:

- The available laboratory results
- Field observations made during the intrusive investigation which did not identify any signs of potential contamination
- Results of the desktop study, which has identified a low risk of contamination.

Soil Stockpile

Based on the laboratory results from the three samples analysed from the stockpile, the stockpile soils would be categorised as **Fill Material** for offsite disposal purposes.

11.3 Groundwater

11.3.1 Groundwater Conditions

Groundwater at the site is present within the Newer Volcanics Basalt at depths of between 0.32 m and 4.23 m below current site surface levels (203.7 - 214.8 m AHD) and is interpreted to be flowing to the south-east.

11.3.2 Groundwater Contamination

The contamination status of site groundwater has been established from the collection of three samples over a single groundwater monitoring event.

The laboratory results recorded exceedance of adopted criteria relevant to the WDE beneficial use as follows:

- Copper, and zinc in all wells; and
- Total Nitrogen in well MW3.

All concentrations of petroleum hydrocarbons and volatile organic contaminants recorded, were at levels below the laboratory reporting limits and below the adopted assessment criteria.

Copper, and Zinc

The concentrations of copper and zinc recorded in site groundwater (which exceeded the adopted WDE criteria) are considered to be attributed to natural background concentrations associated with the mineralogy of the Newer Volcanics geological formation. This is based on:

- The generally low concentrations recorded
- The widespread occurrence of exceeding metal concentrations across the site, including up-gradient, central and down-gradient wells
- The lack of significant on-site sources of metal contamination. No significantly elevated levels of these metals have been recorded in site soils.

Nitrogen

The concentrations of nitrogen recorded in site groundwater (which exceeded the adopted WDE criteria at MW3) are considered also likely to be consistent with regional concentrations and are attributed with local shallow groundwater levels and the current grazing land use. This is based on the consistent nitrogen concentrations recorded across the Study Area, including up-gradient, central and down-gradient wells.

11.3.3 Protected Environmental Values

Water Dependant Ecosystems (WDE)

Based on the reported copper, zinc and total nitrogen concentrations, which exceeded the adopted WDE criteria, the environmental value is theoretically precluded. However, the environmental value is not considered to be precluded based on the following:

- Although the site hosts a natural drainage channel (Tributary 4545) the tributary is ephemeral and has limited habitat values (Streamology 2022)
- The identified copper and zinc concentrations are likely to represent regional background concentrations as opposed to contamination
- The nitrogen levels are also likely to be consistent with regional concentrations across areas with cattle grazing and shallow groundwater levels. Although the adopted criterion for nitrogen (75th percentile value of 1300µg/L) was exceeded in MW3, when considering dilution factors associated with transport and discharge into surface water bodies, the nitrogen concentrations are considered to be at low risk of impacting receiving water bodies.

Potable Water Supply (PWS)

As no exceedance of the adopted criteria relevant to the PWS environmental value was recorded, the environmental value is not precluded.

Based on the nature of the proposed development and future land use, it is considered unlikely that site groundwater would ever be utilised for a potable water supply.

Agriculture and Irrigation (AI)

As no exceedance of the adopted criteria relevant to the AI environmental value (stock water or irrigation), was recorded, the environmental value is not precluded.

Based on the nature of the proposed development and future land use, it is considered unlikely that site groundwater will be utilised for stock water or irrigation.

Water Based Recreation (WBR)

As no exceedance of the adopted criteria relevant to the WBR environmental value was recorded, the environmental value is not precluded.

Groundwater at the site is unlikely to be utilised for recreational purposes under the planned development.

Buildings and Structures

No exceedances of laboratory analysis results for pH, chloride and sulphate to the adopted Buildings and Structures Criteria were recorded and the site groundwater would be classified as non-aggressive to concrete and steel structures. Subsequently the environmental value is not precluded.

11.3.4 Vapour Intrusion Risks

Based on the available results, which recorded concentrations of volatile organic contaminants below the laboratory reporting limit and below the adopted vapour intrusion criteria, it is considered that the site groundwater poses a negligible risk to future site users under the planned development with respect to vapour intrusion.

11.4 Revised Conceptual Site Model

The data collected for this Soil Contamination Investigation has generally found that no contamination is present in quantities high enough to pose a risk to human or ecological health under the proposed industrial land use. As such the identified source - pathway - receptor pathways identified in Section 8 are incomplete due to a lack of source.

12. Risk Assessment

Soil Contamination

Based on the results of the investigation:

- The site soils (natural and fill) are not considered to be contaminated and are considered suitable to remain within an industrial setting, from a soil contamination perspective, without the need for remediation or site-specific management
- If removed from site, the site soils are likely to achieve a Fill Material categorisation in accordance with EPA publication 1828.2. However, the presence of oversized material (cobbles) and brick, metal or plastic fragments within fill at some locations may require that some of the fill be disposed of to landfill.

With the exception of the potential for offsite disposal to landfill (which would require further assessment), The Proposal is considered to be at low risk of being impacted by soil contamination both during construction and in the final condition. Furthermore, the contamination status of soils within the Study Area are considered to present a low risk to nearby environmental receptors and soil management procedures above standard ‘best practice' construction earthworks are not considered to be required.

Groundwater Contamination

Although site groundwater contains concentrations of copper, zinc and total nitrogen above adopted ecosystems criteria, the contaminant concentrations recorded are considered likely to reflect regionally elevated levels. The groundwater is typically neutral to slightly acidic and of low salinity and would be non-aggressive to concrete or steel structures.

Although final groundwater management measures would need to be established following further groundwater investigation, based on the available results, if groundwater is intercepted during the planned works, it is likely that discharge to the local drainage system would be feasible subject to turbidity levels and assessment of water quality within nearby water ways. Any disposal to surface water bodies is likely to require approvals from one or more of EPAV, local council and catchment authorities.

13. Conclusions and Recommendations

The soil and groundwater contamination status established during the investigation indicates that the site is not contaminated and is compatible with the proposed development from a contamination perspective. Furthermore:

- The contaminant concentrations recorded in soil and groundwater are considered to pose an acceptable risk to human health both during construction and in the final condition
- The available results also indicate an acceptable risk to environmental receivers although further sampling and testing of groundwater may be required as detailed below
- The soil and groundwater within the Study Area is unlikely to require remediation and site-specific management
- No specific duties under the Environment Protection Act 2017 Act (including duty to notify) would be invoked by the levels of contaminants identified.

Recommendations for further works include:

- Further sampling and laboratory testing to allow the full categorisation of soils for offsite disposal. The scope of further works would need to be established once offsite disposal volumes are known
- Following decommissioning, excavation and removal of the septic tanks, validation sampling of the pit should take place to confirm there is no ongoing risk to human or ecological receptors
- Further groundwater sampling and laboratory testing to further establish groundwater quality and to assist in the establishment of appropriate groundwater management measures during construction and in the final condition.

14. Limitations

Douglas Partners (DP) has prepared this report for this project at 510 Summerhill Road, Wollert in accordance with DP's proposal dated 9 September 2022. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Arup Australia Pty Ltd 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 and groundwater 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

Notes About this Report

About this Report

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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.

Sampling Methods

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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

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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

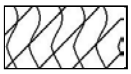

Asphalt


Road base

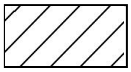

Concrete

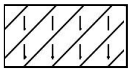

Filling

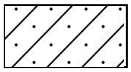
Soils


Topsoil

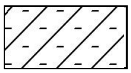

Peat


Clay

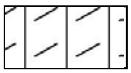

Silty clay

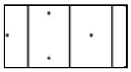

Sandy clay

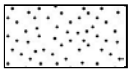

Gravelly clay

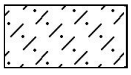

Shaly clay

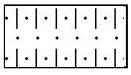

Silt


Clayey silt


Sandy silt

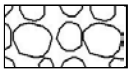

Sand

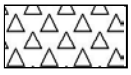

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

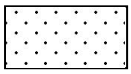

Talus

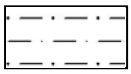
Sedimentary Rocks

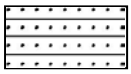

Boulder conglomerate

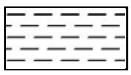

Conglomerate


Conglomeratic sandstone

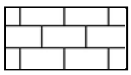

Sandstone


Siltstone

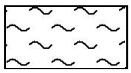

Laminite

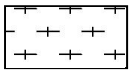

Mudstone, claystone, shale

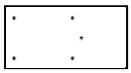

Coal


Limestone

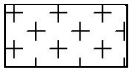
Metamorphic Rocks

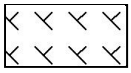

Slate, phyllite, schist

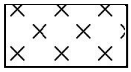

Gneiss

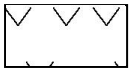

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite

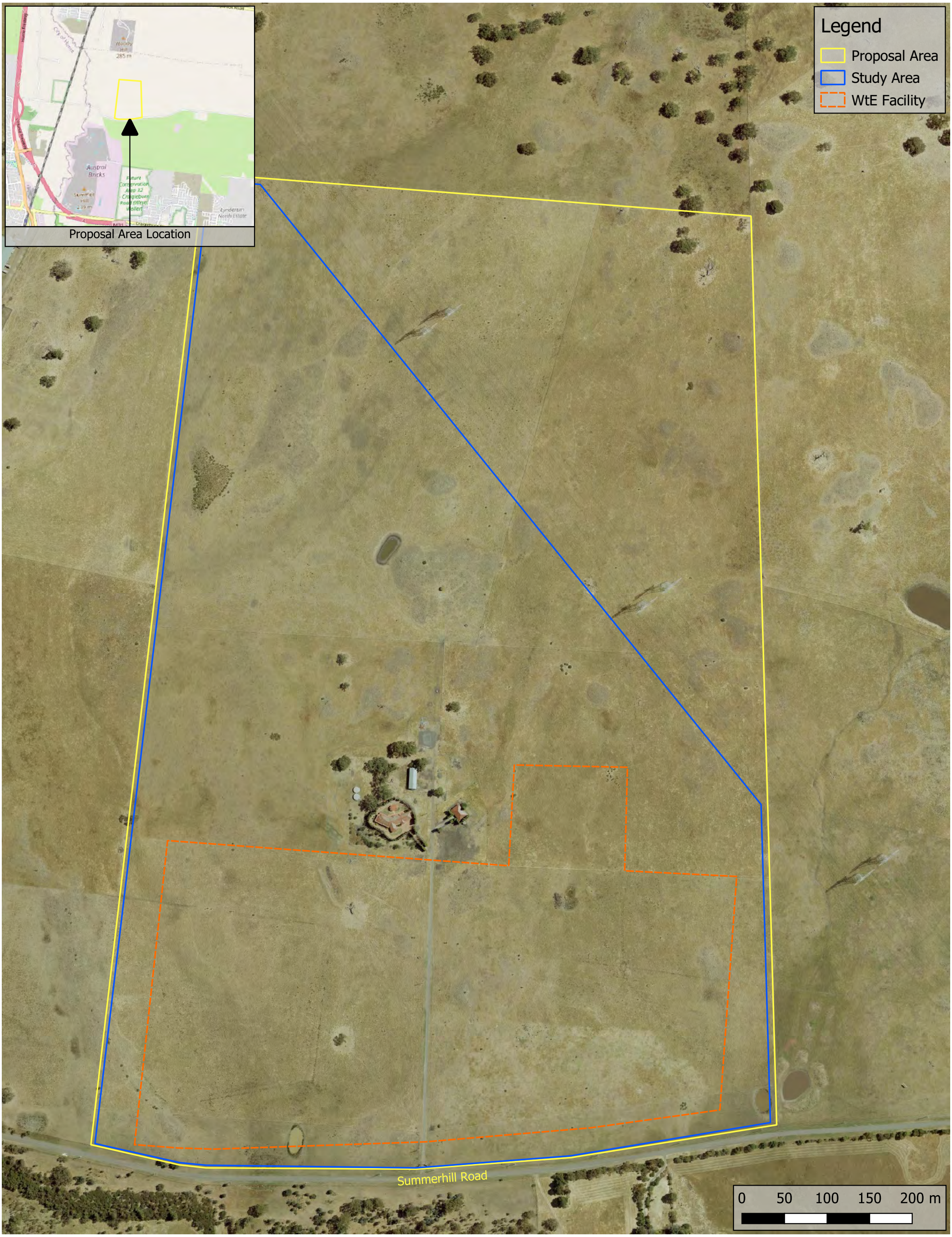

Dacite, epidote


Tuff, breccia

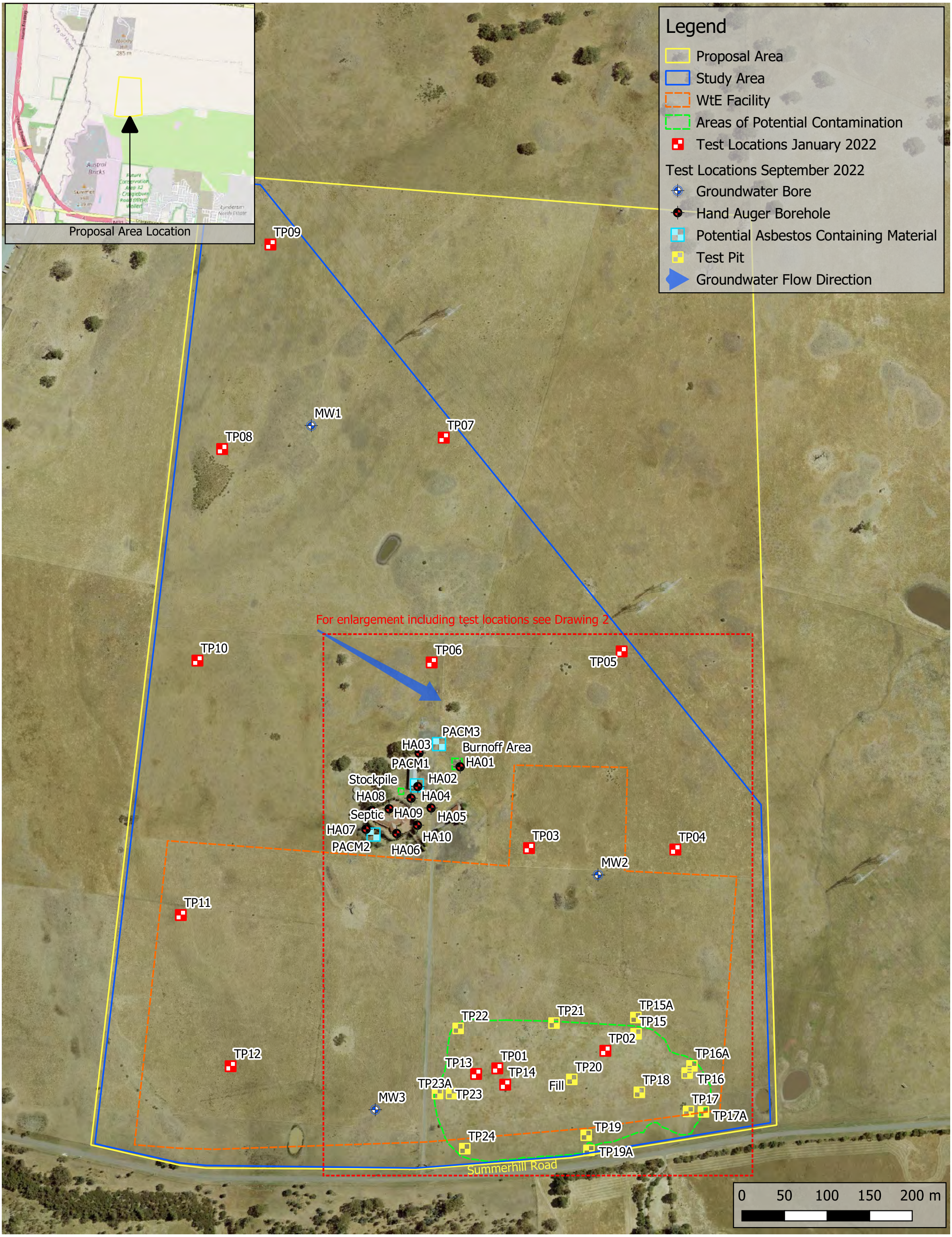

Porphyry

Appendix B

Drawing 1 - Proposal Area Plan
Drawing 2 - Proposal Area and Test Location Plan
Drawing 3 - Test Location Plan Enlargement
Site Photographs



Douglas Partners Geotechnics / Environment / Groundwater	TITLE: Proposal Area Plan Soil and Baseline Groundwater Contamination Investigation Proposed Melbourne Energy and Resource Centre 510 Summerhill Road, Wollert		N MGA	OFFICE: Melbourne DRAWN BY: FS DATE: 22/11/2022
CLIENT: Cleanaway Operations Pty Ltd	PROJECT: 211616.01	DRAWING No: 1	REVISION: 1	SCALE: As Shown

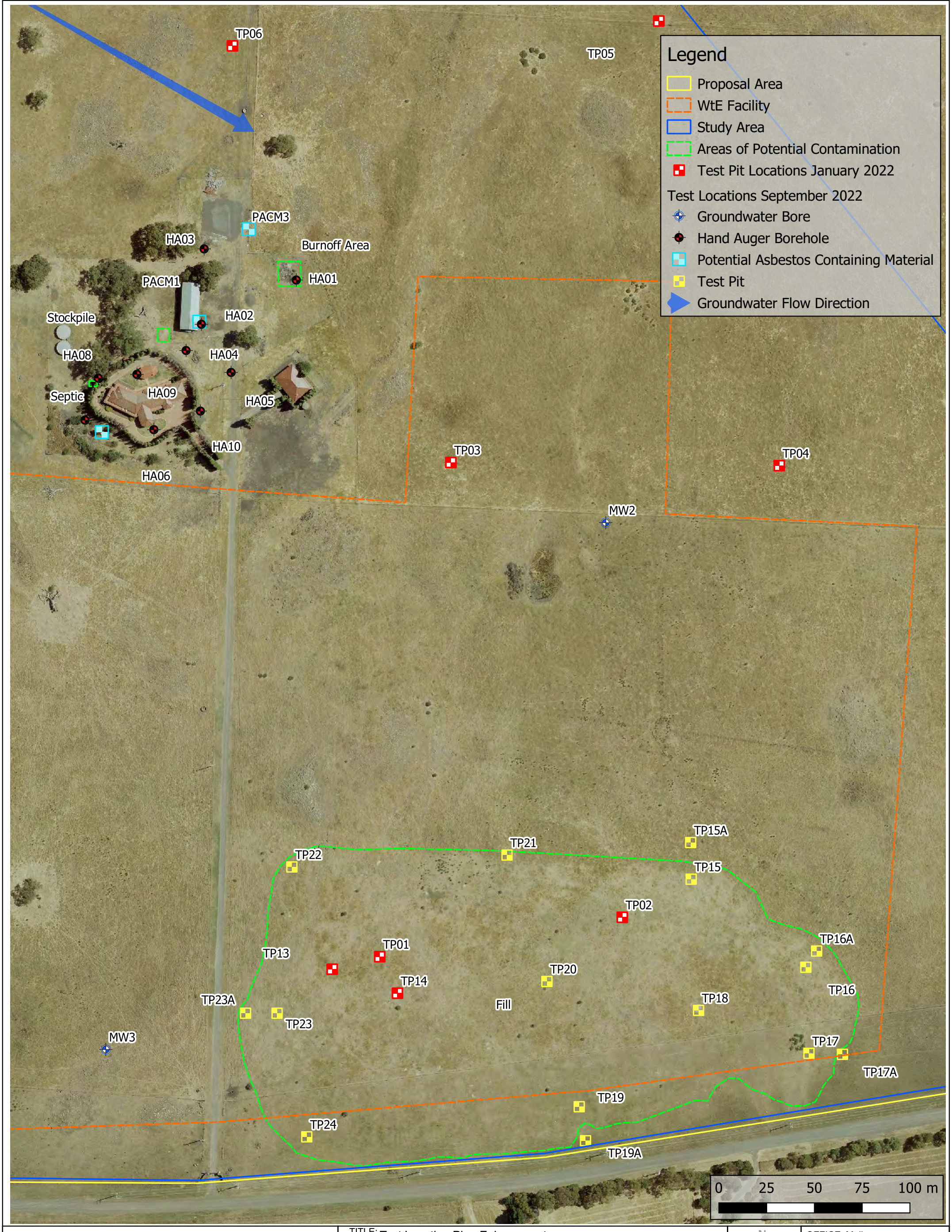


Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: Proposal Area and Test Location Plan
Soil and Baseline Groundwater Contamination Investigation
Proposed Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

OFFICE: Melbourne
DRAWN BY: FS
DATE: 22/11/2022

CLIENT: Cleanaway Operations Pty Ltd
PROJECT: 211616.01
DRAWING No: 2
REVISION: 1
SCALE: As Shown



Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: Test Location Plan Enlargement
Soil and Baseline Groundwater Contamination Investigation
Proposed Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

N
MGA

OFFICE: Melbourne
DRAWN BY: FS
DATE: 22/11/2022

CLIENT: Cleanaway Operations Pty Ltd
PROJECT: 211616.01
DRAWING No: 3
REVISION: 1
SCALE: As Shown

Photo 1 – View of main shed with stockpile in foreground (View to the north-east)

Photo 2 – Burn-off area with dwelling in background (view to the south-west)

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs** **510 Summerhill Road, Wollert** **Soil and Baseline Groundwater Contamination Investigation**	PROJECT:	211616.01
		PLATE No:	1
		REV:	0
	CLIENT: Cleanaway Operations Pty Ltd	DATE:	November 2022

Photo 3 – View edge of former building footing and HA03 (view to the east)

Photo 4 – Fill overlying natural clay (Test Pit TP24)

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs** **510 Summerhill Road, Wollert** **Soil and Baseline Groundwater Contamination Investigation**	PROJECT:	211616.01
		PLATE No:	2
		REV:	0
	CLIENT: Cleanaway Operations Pty Ltd	DATE:	November 2022

Photo 5 – Typical test pit operation

Photo 6 – Natural site soils typically encountered in the test pits.

Douglas Partners Geotechnics | Environment | Groundwater	**Site Photographs** **510 Summerhill Road, Wollert** **Soil and Baseline Groundwater Contamination Investigation**	PROJECT:	211616.01
		PLATE No:	3
		REV:	0
	CLIENT: Cleanaway Operations Pty Ltd	DATE:	November 2022

Appendix C

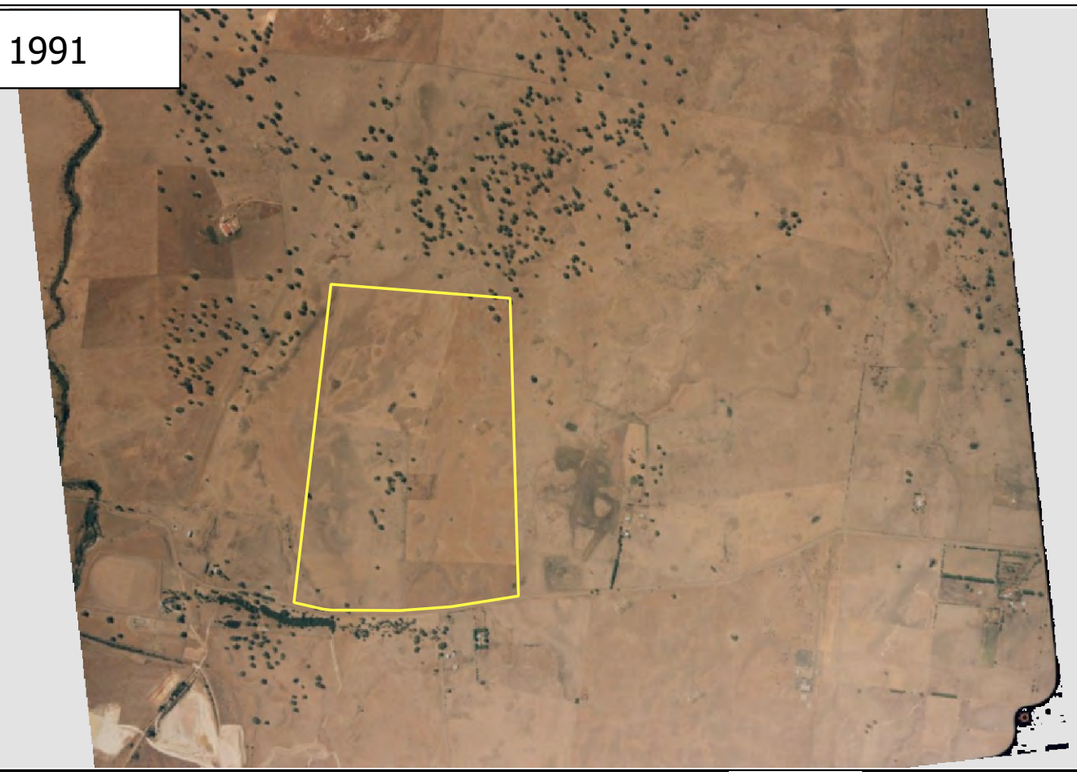
Historical Aerial Photographs

1963

1972

1984

1991



Douglas Partners
Geotechnics | Environment | Groundwater

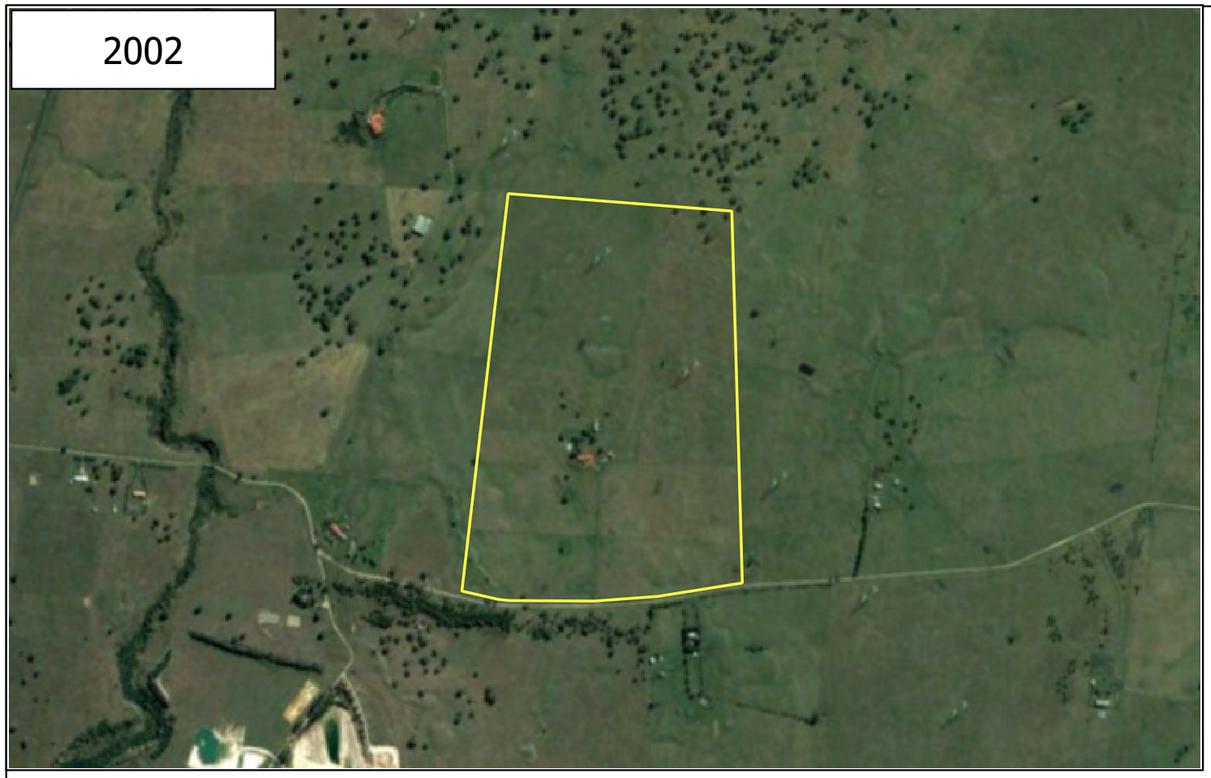
CLIENT: Cleanaway Operations Pty Ltd		
OFFICE: Melbourne	DRAWN BY: FS	
SCALE: NTS	DATE: September 2022	

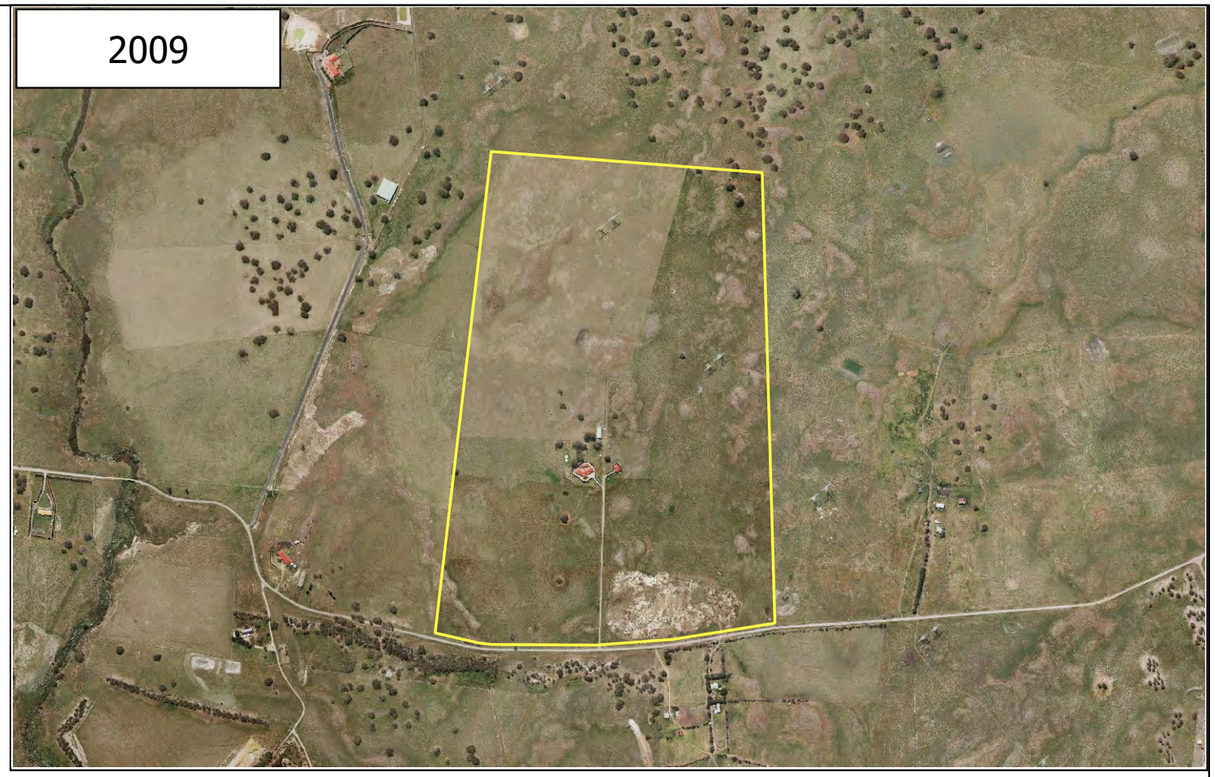
TITLE: Historial Aerial Photographs - 1963 - 1991
Soil Contamination and Baseline Groundwater Investigation
Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

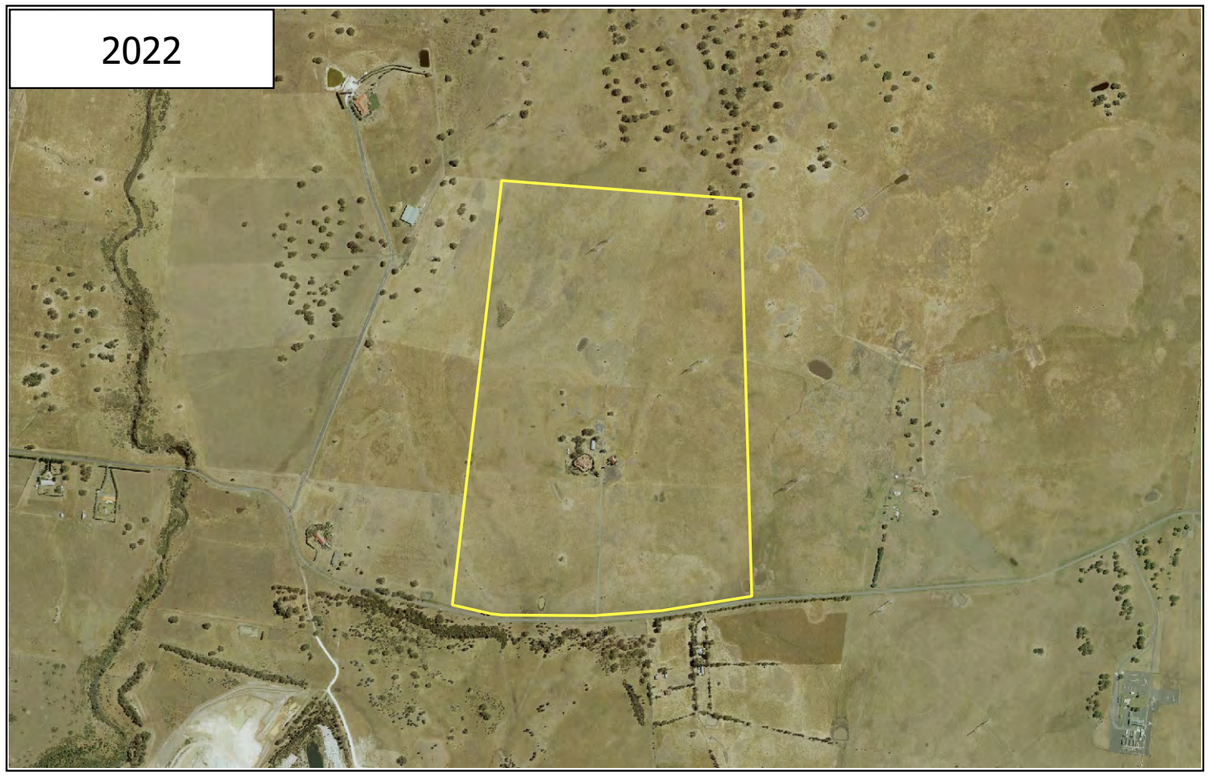
Project Area

N
MGA

PROJ. #: 211616.01	
DRAWING No:	C1
REVISION:	0







Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Cleanaway Operations Pty Ltd		
OFFICE: Melbourne	DRAWN BY: FS	
SCALE: NTS	DATE: September 2022	

TITLE: Historial Aerial Photographs - 2002 - 2022
Soil Contamination and Baseline Groundwater Investigation
Melbourne Energy and Resource Centre
510 Summerhill Road, Wollert

Project Area

N
MGA

PROJ. #: 211616.01	
DRAWING No:	C2
REVISION:	0

Appendix D

Borehole Logs
Test Pit Logs

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 212.2 m AHD
EASTING: 321511
NORTHING: 5839407

PIT No: TP 01
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
212	0.0	Fill / Gravelly CLAY (CI): medium plasticity, fine to coarse subrounded basalt gravel, grey brown, trace coarse sands and metal fragments, w<PL (dry), very stiff to hard; Fill		E	0.0 0.1	TP1-1			
				E	0.5 0.6	TP1-2			
		at 0.6 m: trace angular siltstone cobbles							
211	1								1
	2								2
210	2.3	Silty CLAY (CH): high plasticity, dark grey, w<PL, very stiff; Residual Newer Volcanics							
		from 2.7 m: dark grey to black							
	3								3
	3.1	Pit discontinued at 3.1m. Refusal on rock.							
209									
	4								4
208									

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.3 m AHD
EASTING: 321638
NORTHING: 5839428

PIT No: TP 02
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
208	0.0	Gravelly CLAY (CI): medium plasticity, fine to coarse basalt gravel, pale grey brown, trace coarse sand, dry, w<PL, hard; Residual Newer Volcanics		E	0.0 0.1 0.3	TP2-1	pp = 510-580		
	0.5	Silty CLAY (CH): high plasticity, pale brown, w<PL (moist), very stiff; Residual Newer Volcanics		E	0.5 0.6 0.8	TP2-2	pp = 240-290		
207	1	from 1.5 m: dark grey to black							1
	1.7	Pit discontinued at 1.7m. Refusal on rock.							
206	2								2
205	3								3
204	4								4

5 10 15 20

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 214.0 m AHD
EASTING: 321567
NORTHING: 5839780

PIT No: TP 03
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
214		Silty CLAY (CH): high plasticity, dark grey to brown, w<PL (dry), very stiff; Residual Newer Volcanics		E	0.0 0.1 0.2	TP3-1	pp >600		
	0.4	Pit discontinued at 0.4m. Refusal on rock.							
213	1								1
212	2								2
211	3								3
210	4								4

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 210.7 m AHD
EASTING: 321721
NORTHING: 5839732

PIT No: TP 04
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
210	0.0	Silty CLAY (CH): high plasticity, dark grey to brown, w<PL (dry), hard; Residual Newer Volcanics		E	0.0 0.1	TP4-1			
					0.3		pp >600		
				U_{64}	0.5				
	0.9	Pit discontinued at 0.9m. Refusal on rock.							
209	1								1
208	2								2
207	3								3
206	4								4

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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
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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 221.2 m AHD
EASTING: 321756
NORTHING: 5840040

PIT No: TP 05
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
221	0.0	Silty CLAY (CH): high plasticity, grey to brown, with basalt cobbles and boulders, w<PL (dry), very stiff to hard; Residual Newer Volcanics		E	0.0 0.1	TP5-1			
	0.3	Pit discontinued at 0.3m. Refusal on rock.							
220	1								
219	2								
218	3								
217	4								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 219.4 m AHD
EASTING: 321580
NORTHING: 5840048

PIT No: TP 06
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
219	0.0	Silty CLAY (CH): high plasticity, brown, with fine to coarse subrounded basalt gravel and cobbles, w<PL (dry), hard; Residual Newer Volcanics		E	0.0 0.1	TP6-1			
	0.35	Pit discontinued at 0.35m. Refusal on rock.							
218	1								
217	2								
216	3								
215	4								

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 224.0 m AHD
EASTING: 321769
NORTHING: 5840288

PIT No: TP 07
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
224	0.0	Silty CLAY (CH): high plasticity, dark grey to brown, with basalt boulders, dry, w<PL, hard; Newer Volcanics		E	0.0 0.1	TP7-1			
		at 0.5 m: Basalt rock from 0.5 m.							
	0.8	Pit discontinued at 0.8m. Refusal on rock.							
223	1								1
222	2								2
221	3								3
220	4								4

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 223.4 m AHD
EASTING: 321664
NORTHING: 5840368

PIT No: TP 08
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
223	0.0	Silty CLAY (CH): high plasticity, dark brown, with basalt cobbles, w<PL (dry), hard; Residual Newer Volcanics		E	0.0	TP8-1	pp = 370-420		
					0.1				
				U_{64}					
					0.33				
	0.9	BASALT (HW): brown, slightly vesicular, low to medium strength							
222	1.2	Pit discontinued at 1.2m. Refusal on rock.							
221									
220									
219									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 215.4 m AHD
EASTING: 321257
NORTHING: 5840396

PIT No: TP 09
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
215	0.0	Silty CLAY (CH): high plasticity, grey to brown, w<PL (dry), hard; Residual Newer Volcanics		E	0.0 0.1	TP9-1			
	0.5	from 0.6 m: moist, very stiff		E	0.5 0.6	TP9-2	pp = 240-260		
214	1.5	Pit discontinued at 1.5m. Refusal on rock.							
213									
212									
211									

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 214.8 m AHD
EASTING: 321190
NORTHING: 5840188

PIT No: TP 10
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
214.8	0.0	Silty CLAY (CH): high plasticity, grey brown, w<PL (moist), hard; Residual Newer Volcanics		E	0.0 0.1	TP10-1			
214	0.7	Pit discontinued at 0.7m. Refusal on rock.							
213	1								
212	2								
211	3								
210	4								

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 213.3 m AHD
EASTING: 321171
NORTHING: 5839823

PIT No: TP 11
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
213	0.0	Silty CLAY (CH): high plasticity, dark grey to brown, w<PL (dry), hard; Residual Newer Volcanics		E	0.0 - 0.1	TP11-1			
	0.7	Pit discontinued at 0.7m. Refusal on rock.							
212	1								1
	2								2
211									
	3								3
210									
	4								4
209									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.3 m AHD
EASTING: 321186
NORTHING: 5839476

PIT No: TP 12
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
208	0.0	Silty CLAY (CH): high plasticity, pale brown and grey, w<PL (dry), hard; Residual Newer Volcanics		E	0.0	TP12-1			
	0.1				0.1				
	0.3				0.3		pp >600		
				U_{64}					
	0.55				0.55				
	1								1
207	1.2	Pit discontinued at 1.2m. Refusal on rock.							
	2								2
206									
	3								3
205									
	4								4
204									

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 212.8 m AHD
EASTING: 321486
NORTHING: 5839401

PIT No: TP 13
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
212	0	Fill / Gravelly CLAY (CI): medium plasticity, grey brown and white, with fine to coarse basalt and siltstone gravels and basalt cobbles, w<PL (dry), very stiff; Fill		E	0.0 0.1	TP13-1			
				E	0.5 0.6	TP13-2			
211	1.9	Silty CLAY (CH): high plasticity, grey brown, w<PL (moist), very stiff; Residual Newer Volcanics							
210	2.9	Pit discontinued at 2.9m. Refusal on rock.							
209									
208									

RIG: 16T Excavator
LOGGED: FS
SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Macquarie Group Limited
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 211.9 m AHD
EASTING: 321520
NORTHING: 5839388

PIT No: TP 14
PROJECT No: 211616.00
DATE: 24/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
211	0.0	Fill / Gravely CLAY (CI): medium plasticity, fine to coarse sub-angular basalt gravel, grey brown, with basalt cobbles, w<PL (dry), stiff; Fill		E	0.0 - 0.1	TP14-1			
	0.9	Silty CLAY (CH): high plasticity, yellow, grey and brown, w<PL (moist), stiff to very stiff; Residual Newer Volcanics							
210	1.6	from 1.6 m: dark grey to brown, very stiff							
209	2.5	from 2.5 m: pale grey brown, moist, trace medium subrounded basalt gravel							
208	3.8	Pit discontinued at 3.8m. Refusal on rock.							
207									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 16T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 206.5 mAHD
EASTING: 321674
NORTHING: 5839448

PIT No: TP 15
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
206	0.5	FILL / Silty CLAY (CH): high plasticity, mottled pale grey to brown, with fine to coarse angular siltstone gravel, trace fine to medium brick gravel, moist, w=PL, inferred stiff; FILL		E	0.05 0.15	TP15-0.05 DUP1&2			
205	1.7	Silty CLAY (CH): high plasticity, brown, moist, w<PL, inferred very stiff; Newer Volcanics Group		E	0.6 0.7	TP15-0.6			
204		Pit discontinued at 1.7m. Refusal on basalt.							

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 205.9 mAHD
EASTING: 321673.692
NORTHING: 5839466.945

PIT No: TP15A
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
205	0.0	Silty CLAY (CH): high plasticity, brown, moist, w<PL, inferred very stiff; Newer Volcanics Group							
	0.5	Pit discontinued at 0.5m. Target depth reached.							
	1								1
204									
	2								2
203									

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 205.7 mAHD
EASTING: 321734
NORTHING: 5839401

PIT No: TP 16
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
205	0.0	FILL / Silty CLAY (CH): high plasticity, yellow to brown, trace fine to coarse subangular basaltic gravel, moist, w=PL, inferred very stiff; FILL		E	0.05 0.15	TP16-0.05			
	0.8	SIlty CLAY (CH) high plasticity, brown, with fine to coarse subrounded basaltic gravel, moist, w<PL, inferred very stiff to hard; Newer Volcanics		E	0.8 0.9	TP16-0.8			
204	1.3	Pit discontinued at 1.3m. Target depth reached.							
203									

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 205.0 mAHD
EASTING: 321739.62
NORTHING: 5839410.119

PIT No: TP16A
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
205		FILL / Silty CLAY (CH): high plasticity, yellow to brown, trace fine to coarse subangular siltstone gravel, moist, w=PL, inferred very stiff; FILL							
	0.5	Pit discontinued at 0.5m. Target depth reached.							
204	1								1
203	2								2

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 205.5 mAHD
EASTING: 321736
NORTHING: 5839357

PIT No: TP 17
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
205	0.05	FILL / Silty CLAY (CH): high plasticity, brown, trace subangular basaltic gravel, and sand in top 50 mm, moist, w=PL, inferred very stiff; FILL (reworked natural)		E	0.05	TP17-0.05			
	0.15				0.15				
	0.4	From 0.6m: trace subangular basaltic gravel		E	0.4	TP17-0.4			
	0.5				0.5				
204	1.5	Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred stiff; Newer Volcanics							
	1.6			E	1.6	TP17-1.6			
	1.7				1.7				
203	2.0	Pit discontinued at 2.0m. Target depth reached.							

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 204.1 mAHD
EASTING: 321753.153
NORTHING: 5839356.023

PIT No: TP17A
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
204		Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred stiff; Newer Volcanics							
	0.5	Pit discontinued at 0.5m. Target depth reached.							
203	1								1
202	2								2

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.9 mAHD
EASTING: 321678
NORTHING: 5839379

PIT No: TP 18
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL / Silty CLAY (CI): medium plasticity, pale brown to grey, with fine to coarse sand, trace fine to coarse angular basaltic gravel on surface, moist, w<PL, inferred stiff: Fill (crushed rock)		E	0.05 0.15	TP18-0.05			
	0.2	Silty CLAY (CH): high plasticity, pale brown,with fine to coarse subrounded basaltic gravel and cobbles, moist, w<PL, inferred very stiff; Newer Volcanics Group							
	0.4	Pit discontinued at 0.4m. Refusal on basalt.							
208	1								1
207	2								2
206									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.6 mAHD
EASTING: 321615
NORTHING: 5839329

PIT No: TP 19
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
208	0	FILL / Silty CLAY (CI): medium plasticity, mottled yellow to brown to grey, with siltstone and basalt gravel, moist, w=PL, inferred stiff; FILL		E	0.05 0.15	TP19-0.05			
	1	From 1m: yellow to brown, trace brick fragments		E	1.0 1.1	TP19-1.0			1
		From 1.3m: with basalt cobbles and boulders, inferred top of natural soil							
	1.4	Pit discontinued at 1.4m. Refusal on basalt.							
207	2								2
206									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 207.0 mAHD
EASTING: 321618.643
NORTHING: 5839310.778

PIT No: TP19A
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
207		Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred very stiff; Newer Volcanics							
	0.5	Pit discontinued at 0.5m. Target depth reached.							
206	1								1
205	2								2

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 209.7 mAHD
EASTING: 321598
NORTHING: 5839394

PIT No: TP 20
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
209	0.05	FILL / Silty CLAY (CH): high plasticity, brown, trace angular Siltstone cobbles, moist, w=PL, inferred stiff; FILL		E	0.05	TP20-0.05			
					0.15				
	0.75	Silty CLAY (CH): high plasticity, pale brown, moist, w=PL, inferred Very stiff		E	0.8	TP20-0.8			
	1				0.9				1
208	1.5	Pit discontinued at 1.5m. Target depth reached.							2
	2								
207									

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.4 mAHD
EASTING: 321578
NORTHING: 5839460

PIT No: TP 21
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
208	0.0	FILL / Silty CLAY (CH): high plasticity, mottled yellow to pale brown, moist, w=PL, inferred very stiff; FILL (reworked natural)		E	0.0	TP21-0.05			
					0.15				
	0.2	Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred very stiff; Newer Volcanics							
				E	0.4	TP21-0.4			
					0.5				
	0.8	Pit discontinued at 0.8m. Auger refusal on basalt.							
	1								1
207									
	2								2
206									

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 212.6 mAHD
EASTING: 321465
NORTHING: 5839454

PIT No: TP 22
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
212	0.0	FILL / Silty CLAY (CI): medium to high plasticity, pale brown, trace coarse angular siltstone gravel, moist, w=PL, inferred stiff; FILL		E	0.05	TP22-0.05			
					0.15				
	0.3	Silty CLAY (CH): high plasticity, pale brown, with basalt cobbles and boulders, moist, w=PL, inferred very stiff; Newer Volcanics		E	0.5	TP22-0.5			
					0.6				
	0.7	Pit discontinued at 0.7m. Refusal on basalt.							
211	1								1
	2								2
210									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 211.6 mAHD
EASTING: 321457
NORTHING: 5839378

PIT No: TP 23
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
211	0	FILL / Silty CLAY (CH): high plasticity, mottled dark brown to pale brown, with fine to coarse angular siltstone and basalt gravel and cobbles, trace bricks and glass, moist, w=PL, inferred stiff; FILL			0.05				
				E		TP23-0.05			
					0.15				
		0.7m: trace plastic, scrap metal, coarse granitic gravel			0.5				
				E		TP23-0.5			
					0.6				
210	1.7	Silty CLAY (CH): high plasticity, brown, with basalt cobbles and boulders, fine to coarse subangular gravel, moist, w<PL, inferred very stiff; Newer Volcanics			1.7				
				E		TP23-1.7			
					1.8				
209	2.4	Pit discontinued at 2.4m. Refusal on basalt.							

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 210.3 mAHD
EASTING: 321440.668
NORTHING: 5839377.565

PIT No: TP23A
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
210	0.1	FILL / Silty CLAY (CH): high plasticity, mottled dark brown to pale brown, with fine to coarse angular siltstone and basalt gravel and cobbles, trace brick fragments, moist, w=PL, inferred stiff; FILL							
		Silty CLAY (CH): high plasticity, brown, moist, w<PL, inferred very stiff; Newer Volcanics							
	0.5	Pit discontinued at 0.5m. Target depth reached.							
209	1								1
	2								2
208									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 209.8 mAHD
EASTING: 321473
NORTHING: 5839313

PIT No: TP 24
PROJECT No: 211616.01
DATE: 14/9/2022
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
209	0.0	FILL / Silty CLAY (CH): high plasticity, pale grey and dark brown, trace fine to coarse sand and fine to coarse subangular basalt gravel, moist, w<PL, inferred stiff; FILL From 0.1m: trace coarse sandstone gravel		E	0.05 0.15	TP25-0.05			
	0.6	Silty CLAY (CH): high plasticity, dark grey, moist, w<PL, very stiff; Newer Volcanics Group		E	0.6 0.7	TP24-0.6			
208	1.4	Pit discontinued at 1.4m. Target depth reached.							
207									

RIG: CAT 13T Excavator

LOGGED: FS

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Co-ordinates and levels recorded using a dGPS.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 216.8 mAHD
EASTING: 321467
NORTHING: 5839762
DIP/AZIMUTH: 90°/--

BORE No: HA 01
PROJECT No: 211616.01
DATE: 13/9/2022
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
216.8	0.0	FILL / Sandy GRAVEL (GW): fine to coarse subrounded basaltic gravel, red, fine to coarse sand, trace clay, moist, inferred moderate to loose; FILL (scoria gravel)		E	0.0 0.1	HA01-0.0			
	0.25	From 0.2m: with high plasticity brown clay							
		Bore discontinued at 0.25m. Auger refusal on basalt.							
216	1								1
215	2								2
214									

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased
TYPE OF BORING: Hand Auger (100 mm)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.2 mAHD
EASTING: 321418
NORTHING: 5839738
DIP/AZIMUTH: 90°/--

BORE No: HA 02
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	FILL / Gravelly CLAY (CH): high plasticity, brown, fine to coarse angular and subangular basaltic gravel, with fine to coarse sand, moist, w=PL, inferred soft; FILL		E	0.0	HA02-0.0			
	0.1				0.1				
	0.3	Bore discontinued at 0.3m. Auger refusal on basalt.							
216	1								
215	2								

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.9 mAHD
EASTING: 321419
NORTHING: 5839778
DIP/AZIMUTH: 90°/--

BORE No: HA 03
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	FILL / Clayey GRAVEL (GC): fine to coarse subangular basaltic gravel, brown and grey, high plasticity clay, with fine to coarse sand, trace brick fragments, moist, inferred medium dense; FILL		E	0.0	HA03-0.0			
					0.1				
				E	0.4	HA03-0.4			
					0.5				
	0.7	Silty CLAY (CH): high plasticity, brown, moist, w<PL, inferred firm; Newer Volcanics Group		E	0.7	HA03-0.7			
					0.8				
		From 0.9m: with basaltic cobbles		E	0.9	HA03-0.9			
216	1				1.0				1
	1.1	Bore discontinued at 1.1m. Auger refusal on basalt.							
215	2								2

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 218.0 mAHD
EASTING: 321410
NORTHING: 5839725
DIP/AZIMUTH: 90°/--

BORE No: HA 04
PROJECT No: 211616.01
DATE: 13/9/2022
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
218	0.0	FILL / Silty CLAY (CH): high plasticity, brown, trace fine to coarse sand, moist, w=PL, inferred firm; FILL (reworked natural)		E	0.0	HA04-0.0			
	0.1				0.1				
	0.2	Bore discontinued at 0.2m. Auger refusal on basalt.							
217	1								1
216	2								2

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased
TYPE OF BORING: Hand Auger (100 mm)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.3 mAHD
EASTING: 321433
NORTHING: 5839713
DIP/AZIMUTH: 90°/--

BORE No: HA 05
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred firm; Newer Volcanics Group		E	0.0	HA05-0.0			
					0.1				
					0.4				
				E		HA05-0.4			
	0.5	Bore discontinued at 0.5m. Target depth reached.			0.5				
216	1								1
215	2								2

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.1 mAHD
EASTING: 321393
NORTHING: 5839683
DIP/AZIMUTH: 90°/--

BORE No: HA 06
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	FILL / Silty CLAY (CH): high plasticity, dark grey to brown, trace fine brick fragments, moist, w=PL, inferred firm; FILL (reworked natural)		E	0.0	HA06-0.0			
	0.1				0.1				
	0.35	Bore discontinued at 0.35m. Auger refusal on basalt cobbles.							
216	1								1
215	2								2

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 216.4 mAHD
EASTING: 321357
NORTHING: 5839688
DIP/AZIMUTH: 90°/--

BORE No: HA 07
PROJECT No: 211616.01
DATE: 13/9/2022
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
		FILL / Silty CLAY (CH): high plasticity, dark brown, moist, w=PL, inferred firm; FILL (reworked natural)		E	0.0 0.1	HA07-0.0			
	0.3	Bore discontinued at 0.3m. Auger refusal on basalt boulder.							
216									
	1								1
215									
	2								2
214									

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 216.6 mAHD
EASTING: 321364
NORTHING: 5839710
DIP/AZIMUTH: 90°/--

BORE No: HA 08
PROJECT No: 211616.01
DATE: 13/9/2022
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
		FILL / Silty CLAY (CH): high plasticity, dark brown, with fine to coarse subrounded basaltic gravel in top 50 mm (scoria), moist, w=PL, inferred firm; FILL (reworked natural)		E	0.0 0.1	HA08-0.0			
216	0.3	Bore discontinued at 0.3m. Auger refusal on basalt.							
	1								1
215									
	2								2
214									

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased
TYPE OF BORING: Hand Auger (100 mm)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.2 mAHD
EASTING: 321384
NORTHING: 5839712
DIP/AZIMUTH: 90°/--

BORE No: HA 09
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	FILL / Silty CLAY (CH): high plasticity, brown, trace fine subangular basaltic gravel, brick fragments and plastic, moist, w=PL, inferred firm; FILL		E	0.0 - 0.1	HA09-0.0			
	0.2	Bore discontinued at 0.2m. Auger refusal on concrete.							
	1								1
216									
	2								2
215									

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased
TYPE OF BORING: Hand Auger (100 mm)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 217.2 mAHD
EASTING: 321417
NORTHING: 5839693
DIP/AZIMUTH: 90°/--

BORE No: HA 10
PROJECT No: 211616.01
DATE: 13/9/2022
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
217	0.0	FILL / Gravelly CLAY (CH): high plasticity, dark brown to grey, fine to coarse subangular basaltic gravel, with fine to coarse sand, moist, w=PL, inferred stiff; FILL		E	0.0	HA10-0.0			
	0.1				0.1				
	0.3	Bore discontinued at 0.3m. Auger refusal on basalt.							
216	1								1
215	2								2

RIG: Hand Auger **DRILLER:** DP **LOGGED:** FS **CASING:** Uncased

TYPE OF BORING: Hand Auger (100 mm)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 55 H. Co-ordinates and levels recorded using a dGPS.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 216.4 mAHD
EASTING: 321292
NORTHING: 5840163
DIP/AZIMUTH: 90°/--

BORE No: MW 1
PROJECT No: 211616.01
DATE: 14/9/2022
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
216	0.2	Silty CLAY (CH): high plasticity, brown, w>PL, stiff; Newer Volcanics							
		BASALT (SW): high strength, with occasional MW medium strength and HW low strength zones							
215	1							21-09-22	
214	2								Bentonite to 4.5m; Unslotted PVC to 5m
213	3								
212	4								
211	5								
210	6								Sand filter pack 4.5-8m; Slotted PVC 5m-8m
209	7							14-09-22	
208	8	8.0 Bore discontinued at 8.0m. Target depth reached.							
207	9								

RIG: DB 520 **DRILLER:** Urban Drilling **LOGGED:** JMC **CASING:** NA

TYPE OF BORING: Solid flight auger to 0.2m; hammer drill to 8m.

WATER OBSERVATIONS: Groundwater at 7m during drilling

REMARKS: Location coordinates are in MGA94 Zone 55 H.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.6 mAHD
EASTING: 321367
NORTHING: 3839359
DIP/AZIMUTH: 90°/--

BORE No: MW 3
PROJECT No: 211616.01
DATE: 14/9/2022
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
208	0.6	Silty CLAY (CH): high plasticity, brown, w>PL, stiff; Newer Volcanics						21-09-22	Bentonite to 1.5m; Unslotted PVC to 2m
	1	BASALT (SW): high strength, with occasional MW medium strength and HW low strength zones							
207	2								
206	3								Sand filter pack 1.5-5m; Slotted PVC 2m-5m
205	4							14-09-22	
204	5	5.0							
		Bore discontinued at 5.0m. Target depth reached.							
203	6								
202	7								
201	8								
200	9								
199									

RIG: DB 520 **DRILLER:** Urban Drilling **LOGGED:** JMC **CASING:** NA

TYPE OF BORING: Solid flight auger to 0.6m; hammer drill to 5m.

WATER OBSERVATIONS: Groundwater below 3.5m during drilling

REMARKS: Location coordinates are in MGA94 Zone 55 H.

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: Cleanaway Pty Ltd
PROJECT: Melbourne Energy Resources Centre (MERC)
LOCATION: 510 Summerhill Road, Wollert

SURFACE LEVEL: 208.3 mAHD
EASTING: 321629
NORTHING: 5839635
DIP/AZIMUTH: 90°/--

BORE No: MW2
PROJECT No: 211616.01
DATE: 14/9/2022
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
208		Silty CLAY (CH): high plasticity, brown, w>PL, stiff; Newer Volcanics							
207	1.0	BASALT (SW): high strength, with occasional MW medium strength and HW low strength zones							Unslotted PVC to 3m Bentonite to 3.5m
206									
205									
204								21-09-22	
203									Slotted PVC 3m-7m Sand filter pack 3.5-7m
202									
201	7.0	Bore discontinued at 7.0m. Target depth reached.						14-09-22	
200									
199									

RIG: DB 520 **DRILLER:** Urban Drilling **LOGGED:** JMC **CASING:** NA

TYPE OF BORING: Solid flight auger to 1m; hammer drill to 8m.

WATER OBSERVATIONS: Groundwater below 6.5m during drilling

REMARKS: Location coordinates are in MGA94 Zone 55 H.

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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Appendix E

Tabulated Laboratory Results

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Table E1:
Soil Laboratory Results
Ecological Investigation Levels (EIL) and Health Investigation Levels (HIL)

Sample No	Sample Depth (m bgl)	Strata	Sampling Date	Metals														TRH and MAH															Phenols			Chlorinated Hydrocarbons (CHCs)	Organochlorine Pesticides (OCP)		Polychlorinated Biphenyls	Polycyclic Aromatic Hydrocarbons		
																		BTEXN					MAH			Total Recoverable Hydrocarbons (TRH)																					
				Arsenic	Cadmium	Total Chromium	Chromium VI	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	Cyanide	Fluoride	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Naphthalene	Styrene	Cumene	1,2,4 trimethylbenzene	F1	F2	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Phenol	Pentachlorophenol	Cresols		Total	DDT		Benzo(a)pyrene (BaP)	Carcinogenic PAHs (as BaP TEQ)	Total PAH
				(mg/kg)													(mg/kg)	(mg/kg)	(mg/kg)																							
SITE ASSESSMENT CRITERIA (SAC)																																										
NEPM HIL(D) CRITERIA[1] *(Commercial / Industrial)*				**3,000**	**900**		**3,600**	**240,000**	**1,500**	**730**		**6,000**	**10,000**			**400,000**	**1,500**																**240,000**	**660**	**25,000**			**3,600**	**7**		**40**	**4,000**
NEPM EIL/ESL *(Commercial / Industrial)*				**160**		**670**		**320**	**1800**	**1**		**490**				**1,200**			**95**	**135**	**185**	**95**					**215**	**170**			**2500**	**6600**					**640**		**1.4**		
January 2022																																										
TP1-1	0-0.1	Fill (Gravelly CLAY)		<4	<0.4	40	<1	17	10	<0.1	<1	39	<2	<1	<1	25	<0.5	280	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.05
TP2-1	0-0.1	Gravelly CLAY		<4	<0.4	21	-	9	11	<0.1	<1	10	<2	<1	<1	8	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP3-1	0-0.1	Silty CLAY		<4	<0.4	35	<1	10	8	<0.1	<1	11	<2	<1	<1	9	<0.5	130	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP4-1	0-0.1	Silty CLAY		<4	<0.4	55	-	13	8	<0.1	<1	31	<2	<1	<1	15	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP5-1	0-0.1	Silty CLAY	24/01/2022	<4	<0.4	80	-	11	9	<0.1	<1	17	<2	<1	<1	10	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP7-1	0-0.1	Silty CLAY		<4	<0.4	55	-	13	9	<0.1	<1	19	<2	<1	<1	16	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP9-1	0-0.1	Silty CLAY		<4	<0.4	26	-	6	8	<0.1	<1	10	<2	<1	<1	7	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP11-1	0-0.1	Silty CLAY		<4	<0.4	30	-	8	7	<0.1	<1	15	<2	<1	<1	10	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP12-1	0-0.1	Silty CLAY		<4	<0.4	26	-	6	8	<0.1	<1	9	<2	<1	<1	9	-	-	<0.2	<0.5	<1	<1	<0.1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP13-1	0-0.1	Fill (Gravelly CLAY)		<4	<0.4	34	<1	11	9	<0.1	<1	22	<2	<1	<1	14	<0.5	280	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.05
September 2022																																										
SP1	-	FILL (Gravelly CLAY)		<4	<0.4	24	-	12	17	<0.1	<1	9	<2	<1	1	24	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
SP2	-	FILL (Gravelly CLAY)		4	<0.4	30	-	15	15	<0.1	<1	18	<2	<1	2	32	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
SP3	-	FILL (Gravelly CLAY)		<4	<0.4	29	-	15	11	<0.1	<1	16	<2	<1	1	18	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA01-0.0	0-0.1	FILL (Sandy GRAVEL)		<4	<0.4	19	-	30	<1	<0.1	<1	170	<2	<1	<1	34	<0.5	210	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.05
HA02-0.0	0-0.1	FILL (Gravelly CLAY)		<4	<0.4	30	-	24	12	<0.1	<1	47	<2	<1	<1	39	<0.5	170	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<25	<50	<25	<50	<100	<100	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.05
HA03-0.0	0-0.1	FILL (Clayey GRAVEL)		<4	<0.4	23	-	31	10	<0.1	<1	85	<2	<1	<1	48	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA04-0.0	0-0.1	FILL (Silty CLAY)	13/09/2022	<4	<0.4	47	-	11	12	<0.1	<1	21	<2	<1	<1	22	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA05-0.0	0-0.1	Silty CLAY		<4	<0.4	78	-	16	9	<0.1	<1	21	<2	<1	<1	22	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA06-0.0	0-0.1	FILL (Silty CLAY)		<4	<0.4	47	-	11	10	<0.1	<1	27	<2	<1	<1	20	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA07-0.0	0-0.1	FILL (Silty CLAY)		<4	<0.4	35	-	8	10	<0.1	<1	23	<2	<1	<1	14	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA08-0.0	0-0.1	FILL (Silty CLAY)		<4	<0.4	51	-	25	15	<0.1	<1	28	<2	<1	<1	40	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	170	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA09-0.0	0-0.1	FILL (Silty CLAY)		<4	<0.4	22	-	12	16	<0.1	<1	13	<2	<1	1	29	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
HA10-0.0	0-0.1	FILL (Gravelly CLAY)		<4	<0.4	41	-	17	7	<0.1	<1	24	<2	<1	<1	22	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP15-0.05	0.05-0.15	FILL (Silty CLAY)		<4	<0.4	43	-	15	11	<0.1	<1	40	<2	<1	<1	20	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP16-0.05	0.05-0.15	FILL (Silty CLAY)		8	<0.4	27	-	9	15	<0.1	<1	12	<2	<1	<1	13	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP17-0.4	0.4-0.5	FILL (Silty CLAY)		6	<0.4	23	-	8	14	<0.1	<1	12	<2	<1	<1	12	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP18-0.05	0.05-0.15	FILL (Silty CLAY)		5	<0.4	9	-	5	11	<0.1	<1	8	<2	<1	<1	6	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP19-1.0	1-1.1	FILL (Silty CLAY)	14/09/2022	5	<0.4	55	-	29	15	<0.1	<1	67	<2	<1	1	48	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP20-0.05	0.05-0.15	FILL (Silty CLAY)		6	<0.4	54	-	34	12	<0.1	<1	73	<2	<1	1	40	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP21-0.05	0.05-0.15	FILL (Silty CLAY)		7	<0.4	25	-	10	26	<0.1	<1	14	<2	<1	<1	30	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	0.11	<0.5	0.87
TP22-0.05	0.05-0.15	FILL (Silty CLAY)		6	<0.4	29	-	13	15	<0.1	<1	13	<2	<1	<1	21	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP23-0.5	0.5-0.6	FILL (Silty CLAY)		<4	<0.4	37	-	19	8	<0.1	<1	43	<2	<1	<1	23	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
TP24-0.05	0.05-0.15	FILL (Silty CLAY)		<4	<0.4	30	-	20	4	<0.1	<1	50	<2	<1	<1	27	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
Quality Control Samples																																										
TP15-0.05	0.05-0.15	FILL (Silty CLAY)	14/09/2022	<4	<0.4	43	-	15	11	<0.1	<1	40	<2	<1	<1	20	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
DUP1				*<4*	*<0.4*	*46*	-	*23*	*8*	*<0.1*	*<1*	*53*	*<2*	*<1*	*<1*	*26*	-	-	*<0.2*	*<0.5*	*<1*	*<2*	*<1*	-	-	-	*<25*	*<50*	*<25*	*<50*	*<100*	*<100*	-	-	-	-	-	-	-	*<0.05*	*<0.5*	*<0.05*
Intralab RPD				BL	BL	7	-	42	32	BL	BL	28	BL	BL	BL	26	-	-	BL	BL	BL	BL	BL	-	-	-	BL	BL	BL	BL	BL	BL	-	-	-	-	-	-	-	BL	BL	BL
TP15-0.05	0.05-0.15	FILL (Silty CLAY)	14/09/2022	<4	<0.4	43	-	15	11	<0.1	<1	40	<2	<1	<1	20	-	-	<0.2	<0.5	<1	<2	<1	-	-	-	<25	<50	<25	<50	<100	<100	-	-	-	-	-	-	-	<0.05	<0.5	<0.05
DUP2				*<5*	*<0.2*	*71*	-	*20*	*14*	*0.11*	-	*67*	-	-	-	*46*	-	-	-	-	-	-	-	-	-	-	*<20*	*<20*	*<50*	*<50*	*<50*	*<50*	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*
Interlab RPD				BL	BL	49	-	29	24	BL	-	51	-	-	-	79	-	-	-	-	-	-	-	-	-	-	BL	BL	BL	BL	BL	BL	-	-	-	-	-	-	-	BL	BL	BL

Notes

	A blank space indicates no test performed, or no criteria available
630	Coloured cell represents exceedance of the NEPM HIL (D) or EIL criteria
LR	Laboratory reporting limit raised
22	Blue shaded cell indicates the RPD for INTRALAB sample pair is greater than the adopted 50% criterion
22	Red shaded cell indicates the RPD for INTERLAB sample pair is greater than the adopted 50% criterion

References for Criteria

1) National Environmental Protection Council (NEPC), National Environmental Protection Measure (NEPM) for Assessment of Site Contamination, December 1999, Amended 2013.

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Table E2: Soil Laboratory Results
Health Screening Levels (HSL)

Sample No	Sample Depth (m bgl)	Strata	Sample Date	TRH and BTEXN											
				BTEXN					Total Recoverable Hydrocarbons (TRH)						
				Benzene	Toluene	Ethyl Benzene	Total Xylenes	Naphthalene	F1	F2	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40
				(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SITE ASSESSMENT CRITERIA (SAC)															
CRC CARE HSL[1] *(Fine Textured Soil)*		**Vapour Intrusion 0 m to <1m**	**Commercial / Industrial Land Use (HSL-D)**	**0.5**	**160**	**55**	**40**	**3**	**45**	**110**				
				NL	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
				4	**NL**	**NL**	**230**	**NL**	**310**	**NL**				
		Vapour Intrusion >1 m to <2m	**Commercial / Industrial Land Use (HSL-D)**	**0.5**	**220**	**NL**	**60**	**NL**	**70**	**240**				
				NL	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
				6	**NL**	**NL**	**NL**	**NL**	**480**	**NL**				
		Vapour Intrusion >2m to <4m	**Commercial / Industrial Land Use (HSL-D)**	**0.5**	**310**	**NL**	**95**	**NL**	**110**	**440**				
				NL	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
				9	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
		Vapour Intrusion >4m	**Commercial / Industrial Land Use (HSL-D)**	**0.5**	**540**	**NL**	**170**	**NL**	**200**	**NL**				
				NL	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
				20	**NL**	**NL**	**NL**	**NL**	**NL**	**NL**				
		Direct Contact	**Commercial / Industrial Land Use (HSL-D)**	**100**	**14,000**	**4,500**	**12,000**	**1,400**			**4,400**	**3,300**	**4,500**	**6,300**
				140	**21,000**	**5,900**	**17,000**	**2,200**			**5,600**	**4,200**	**5,800**	**8,100**
				120	**18,000**	**5,300**	**15,000**	**1,900**			**5,100**	**3,800**	**5,300**	**7,400**
				430	**99,000**	**27,000**	**81,000**	**11,000**			**26,000**	**20,000**	**27,000**	**38,000**
				430	**99,000**	**27,000**	**81,000**	**11,000**			**26,000**	**20,000**	**27,000**	**38,000**
Management Limits[2] (Fine Textured *soil)*		**Commercial / Industrial**							**800**	**1,000**			**5,000**	**10,000**
January 2022														
TP1-1	0-0.1	Fill (Gravelly CLAY)	24/01/2022	<0.1	<0.1	<0.1	<0.2	<0.1	<25	<50	<25	<50	<100	<100
TP2-1	0-0.1	Gravelly CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP3-1	0-0.1	Silty CLAY		<0.1	<0.1	<0.1	<0.2	<0.1	<25	<50	<25	<50	<100	<100
TP4-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP5-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP7-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP9-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP11-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP12-1	0-0.1	Silty CLAY		<0.2	<0.5	<1	<1	<0.1	<25	<50	<25	<50	<100	<100
TP13-1	0-0.1	Fill (Gravelly CLAY)		<0.1	<0.1	<0.1	<0.2	<0.1	<25	<50	<25	<50	<100	<100
September 2022														
SP1	Stockpile	FILL (Gravelly CLAY)	13/09/2022	<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
SP2	Stockpile	FILL (Gravelly CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
SP3	Stockpile	FILL (Gravelly CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA01-0.0	0-0.1	FILL (Sandy GRAVEL)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA02-0.0	0-0.1	FILL (Gravelly CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA03-0.0	0-0.1	FILL (Clayey GRAVEL)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA04-0.0	0-0.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA05-0.0	0-0.1	Silty CLAY		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA06-0.0	0-0.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA07-0.0	0-0.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA08-0.0	0-0.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	170	<100
HA09-0.0	0-0.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
HA10-0.0	0-0.1	FILL (Gravelly CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP15-0.05	0.05-0.15	FILL (Silty CLAY)	14/09/2022	<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP16-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP17-0.4	0.4-0.5	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP18-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP19-1.0	1-1.1	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP20-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP21-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP22-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP23-0.5	0.5-0.6	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100
TP24-0.05	0.05-0.15	FILL (Silty CLAY)		<0.2	<0.5	<1	<2	<1	<25	<50	<25	<50	<100	<100

Notes

	A blank space indicates no test performed, or no criteria available
630	Represents exceedance of the NEPM HSL or ESL Vapour Intrusion Criteria
7,100	Represents exceedance of the NEPM Direct Contact or Management Limit Criteria
NL	No Limit

References for Criteria

1) CRC CARE, "Technical Report no. 10, Health screening levels for petroleum hydrocarbons in soil and groundwater", September 2011
2) National Environmental Protection Council (NEPC), National Environmental Protection Measure (NEPM) for Assessment of Site Contamination, December 1999, Amended 2013.

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Table E3
Comparison of Soil Laboratory Results to Waste Categorisation Criteria

Sample No	Strata	Sample Depth	Sample Date	pH	Metals																						Total Petroleum Hydrocarbons (TPH)		Monocyclic Aromatic Hydrocarbons (MAH)						Total Fluoride	Cyanide	Phenols		Chlorinated Hydrocarbons (CHCs)	Organochlorine Pesticides (OCP)			Polychlorinated Biphenyls	Polycyclic Aromatic Hydrocarbons (PAH)		
					Arsenic		Cadmium		Chromium			Copper		Lead		Mercury		Molybdenum		Nickel		Selenium		Silver		Tin	Zinc														DDT+DDD+DDE							
					Total	ASLP	Total	ASLP	Total Chromium	Total Chromium VI	ASLP Chromium VI	Total	ASLP	Total	ASLP	Total	ASLP	Total	ASLP	Total	ASLP	Total	ASLP	Total	ASLP	Total	Total	ASLP	TPH C6-C9	TPH C10-C36	Benzene	Toluene	Ethyl Benzene	Xylenes	Styrene	Total MAH	Total Fluoride	Cyanide	Total Phenols (Halogenated)	Total Phenols (Non-Halogenated)	Chlorinated Hydrocarbons (CHCs)	Total	ASLP	Total OCPs	Polychlorinated Biphenyls	Benzo(a)Pyrene (B(a)P)	ASLP BaP	Total PAH
				(pH units)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/kg)	(mg/L)	(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/L)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/L)	(mg/kg)
MAXIMUM FOR FILL MATERIAL[1]					20		3			1		100		300		1		40		60		10		10		50	200		100	1,000	1				7	450	50	1	60	1			1	2	1		20
MAXIMUM FOR CATEGORY D[1]				<4 - >10	500	0.5	100	0.1		500	2.5	5,000	100	1,500	0.5	75	0.05	1,000	2.5	3,000	1	10,000	0.5	180	5		35,000	150	325	5,000	4	3,200	1,200	2,400	120		10,000	2,500		560		50	0.45	10	2	20	0.0005	50
MAXIMUM FOR CATEGORY C[1]					500	1	100	0.2		500	5	5,000	200	1,500	1	75	0.1	1,000	5	3,000	2	10,000	1	180			35,000	300	650	10,000	4	3,200	1,200	2,400	120	70	10,000	2,500	10	560	10	50	0.9	10	50	40	0.001	100
MAXIMUM FOR CATEGORY B[1]				<2 - >12	2,000	4	400	0.8		2,000	20	20,000	800	6,000	4	300	0.4	4,000	20	12,000	8	40,000	4	720			140,000	1,200	2,600	40,000	16	12,800	4,800	9,600	480	240	40,000	10,000	320	2,200	50	50		50		160	0.004	400
January 2022																																														
FILL																																														
TP1-1	0-0.1	0-0.1	24/01/2022	8.2	<4		<0.4		40	<1		17		10		<0.1		<1		39		<2		<1		<1	25		<25	<50	<0.1	<0.1	<0.1	<0.2	<0.1	<7	280	<0.5	<0.1	<60	<0.1	<0.1		<0.1	<0.1	<0.05		<0.05
TP13-1	0-0.1	0-0.1	24/01/2022	8.2	<4		<0.4		34	<1		11		9		<0.1		<1		22		<2		<1		<1	14		<25	<50	<0.1	<0.1	<0.1	<0.2	<0.1	<7	280	<0.5	<0.1	<60	<0.1	<0.1		<0.1	<0.1	<0.05		<0.05
NATURAL																																														
TP2-1	Gravelly CLAY	0-0.1	24/01/2022		<4		<0.4		21			9		11		<0.1		<1		10		<2		<1		<1	8		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP3-1	Silty CLAY	0-0.1	24/01/2022	6.5	<4		<0.4		35	<1		10		8		<0.1		<1		11		<2		<1		<1	9		<25	<50	<0.1	<0.1	<0.1	<0.2	<0.1	<7	130	<0.5	<0.1	<60	<0.1	<0.1		<0.1	<0.1	<0.05		<0.05
TP4-1	Silty CLAY	0-0.1	24/01/2022		<4		<0.4		55			13		8		<0.1		<1		31		<2		<1		<1	15		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP5-1	Silty CLAY	0-0.1	24/01/2022		<4		<0.4		80			11		9		<0.1		<1		17		<2		<1		<1	10		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP7-1	Silty CLAY	0-0.1	24/01/2022		<4		<0.4		55			13		9		<0.1		<1		19		<2		<1		<1	16		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP9-1	Silty CLAY	0-0.1	24/01/2022	6.5	<4		<0.4		26			6		8		<0.1		<1		10		<2		<1		<1	7		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP11-1	Silty CLAY	0-0.1	24/01/2022		<4		<0.4		30			8		7		<0.1		<1		15		<2		<1		<1	10		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
TP12-1	Silty CLAY	0-0.1	24/01/2022		<4		<0.4		26			6		8		<0.1		<1		9		<2		<1		<1	9		<25	<50	<0.2	<0.5	<1	<1												<0.05		<0.05
September 2022																																														
FILL																																														
Stockpile																																														
SP1	FILL (Gravelly CLAY)	Stockpile	13/09/2022		<4		<0.4		24			12		17		<0.1		<1		9		<2		<1		1	24		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
SP2	FILL (Gravelly CLAY)	Stockpile	13/09/2022		4		<0.4		30			15		15		<0.1		<1		18		<2		<1		2	32		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
SP3	FILL (Gravelly CLAY)	Stockpile	13/09/2022		<4		<0.4		29			15		11		<0.1		<1		16		<2		<1		1	18		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
Residential Area																																														
HA01-0.0	FILL (Sandy GRAVEL)	0-0.1	13/09/2022		<4		<0.4		19			30		<1		<0.1		<1		**170**	0.2	<2		<1		<1	34		<25	<50	<0.2	<0.5	<1	<2	<0.1	<2	210	<0.5	<1	<50	<0.1	<0.1		<0.1	<0.1	<0.05		<0.05
HA02-0.0	FILL (Gravelly CLAY)	0-0.1	13/09/2022		<4		<0.4		30			24		12		<0.1		<1		47		<2		<1		<1	39		<25	<50	<0.2	<0.5	<1	<2	<0.1	<2	170	<0.5	<1	<50	<0.1	<0.1		<0.1	<0.1	<0.05		<0.05
HA03-0.0	FILL (Clayey GRAVEL)	0-0.1	13/09/2022		<4		<0.4		23			31		10		<0.1		<1		**85**		<2		<1		<1	48		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA04-0.0	FILL (Silty CLAY)	0-0.1	13/09/2022		<4		<0.4		47			11		12		<0.1		<1		21		<2		<1		<1	22		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA06-0.0	FILL (Silty CLAY)	0-0.1	13/09/2022		<4		<0.4		47			11		10		<0.1		<1		27		<2		<1		<1	20		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA07-0.0	FILL (Silty CLAY)	0-0.1	13/09/2022		<4		<0.4		35			8		10		<0.1		<1		23		<2		<1		<1	14		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA08-0.0	FILL (Silty CLAY)	0-0.1	13/09/2022		<4		<0.4		51			25		15		<0.1		<1		28		<2		<1		<1	40		<25	130	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA09-0.0	FILL (Silty CLAY)	0-0.1	13/09/2022		<4		<0.4		22			12		16		<0.1		<1		13		<2		<1		1	29		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
HA10-0.0	FILL (Gravelly CLAY)	0-0.1	13/09/2022		<4		<0.4		41			17		7		<0.1		<1		24		<2		<1		<1	22		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
Imported Fill																																														
TP15-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		<4		<0.4		43			15		11		<0.1		<1		40		<2		<1		<1	20		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP16-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		8		<0.4		27			9		15		<0.1		<1		12		<2		<1		<1	13		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP17-0.4	FILL (Silty CLAY)	0.4-0.5	14/09/2022		6		<0.4		23			8		14		<0.1		<1		12		<2		<1		<1	12		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP18-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		5		<0.4		9			5		11		<0.1		<1		8		<2		<1		<1	6		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP19-1.0	FILL (Silty CLAY)	1-1.1	14/09/2022		5		<0.4		55			29		15		<0.1		<1		**67**		<2		<1		1	48		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP20-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		6		<0.4		54			34		12		<0.1		<1		**73**	0.05	<2		<1		1	40		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP21-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		7		<0.4		25			10		26		<0.1		<1		14		<2		<1		<1	30		<25	<50	<0.2	<0.5	<1	<2		<2									0.11		0.87
TP22-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		6		<0.4		29			13		15		<0.1		<1		13		<2		<1		<1	21		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP23-0.5	FILL (Silty CLAY)	0.5-0.6	14/09/2022		<4		<0.4		37			19		8		<0.1		<1		43		<2		<1		<1	23		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
TP24-0.05	FILL (Silty CLAY)	0.05-0.15	14/09/2022		<4		<0.4		30			20		4		<0.1		<1		50		<2		<1		<1	27		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05
95% UCL		**Imported Fill**																		45																												
		All Fill																		50																												
NATURAL																																														
HA05-0.0	Silty CLAY	0-0.1	13/09/2022		<4		<0.4		78			16		9		<0.1		<1		21		<2		<1		<1	22		<25	<50	<0.2	<0.5	<1	<2		<2									<0.05		<0.05

Notes

	A blank space indicates no test performed, or no criteria available
LORR	Limit of reporting has been raised due to high moisture content, insufficient sample or matrix interference
ASLP	Australian Standard Leaching Procedure - Leachable Concentration
#	Laboratory result is consistent with Category D Contaminated Soil
#	Laboratory result is consistent with Category C Contaminated Soil
#	Laboratory result is consistent with Category B Contaminated Soil
#	Laboratory result is consistent with Category A Contaminated Soil

References for Upper Limits

1) Environment Protection Authority of Victoria (EPA), March 2021: EPA Publication 1828.2 "Waste Disposal Categories - Characteristics and Thresholds".

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Table E4 - GROUNDWATER INVESTIGATION RESULTS
Comparison of Groundwater Laboratory Results to Environmental Value Criteria

Sample ID	Sample Date	Water Quality											Nitrogen Species					Metals											BTEX				Total Recoverable Hydrocarbons (TRH)								Chlorinated Hydrocarbons (Total)	Organochloride Pesticides (Total)
		TDS	Electrical Conductivity	pH	Chloride	Sulphate	Calcium	Potassium	Sodium	Magnesium	Bicarbonate Alkalinity	Total Alkalinity	Ammonia	Nitrate Nitrogen (N mg/L)	Nitrite Nitrogen (N mg/L)	TKN	Total Nitrogen	Arsenic	Cadmium	Total Chromium	Chromium (VI)	Copper	Lead	Mercury	Nickel	Selenium	Tin	Zinc	Benzene	Toluene	Ethyl Benzene	Total Xylene	TRH F1	TRH F2	TRH C_6-C_{10}	TRH C_{10}-C_{16}	TRH C_{16} - C_{34}	TRH C_{34}-C_{40}	TRH C_{10}-C_{40}		
		mg/L	µS/cm						mg/L				µg/L					µg/L											µg/L				µg/L								µg/L	
Water Dependant Ecosystems[1]													900	700			1300[16]	13[10]	0.2	42[12]	0.4	1.4	3.4	0.6[10]	11[10]	11[10]	180[12]	8	950	180[10]	80[10]	550							600[14]		
Potable Water[2]						500							412	11,286	912			10	2	50[13]	50	2,000	10	1	20	10	12,000[9]	3,000	1	800/25#	300/3#	600/20#			300[11]				600[14]		
Agriculture and Irrigation (Irrigation Water)[3]						1,000									3,040[15]			100	10	100		200	2,000	2	200	20		2,000													
Agriculture and Irrigation (Stock Water)[4]				5.0 - 9.0		1,000							412[2]	90,293	9,119			500	10	1,000	50[2]	400	100	2	1,000	20	12,000[9]	20,000	1[2]	800/25#	300/3#	600/20#			300[11]				600[14]		
Water Based Recreation				6.5 - 8.5		250#							412	112,866	9,119			100	20	500[13]	500	1,000	100	1	200	100	12,000[9]	3,000#	1	800/25#	300/3#	600/20#			300[11]				600[14]		
Buildings and Structures[5]				<5.5	6,000	1,000																																			
Health Screening Levels for Vapour Intrusion																													2 m to <4 m (SAND)												
Commercial / Industrial																													5,000	NL	NL	NL	6000	NL							
MW1-210922	21/09/2022	320	430	7	47	18	16	2	39	14	130	130	31	510	130	500	1,100	<1	<0.1	<1	-	7	<1	<0.05	5	<1	2	27	<1	<1	<1	<1	<10	<50	<10	<50	<100	<100	<100	ND*	<0.2
MW2-210922	21/09/2022	330	490	6.5	57	35	12	0.7	46	16	100	100	45	130	8	1,100	1,200	<1	<0.1	<1	-	3	<1	<0.05	7	<1	<1	15	<1	<1	<1	<1	<10	<50	<10	<50	<100	<100	<100	ND*	<0.2
MW3-210922	21/09/2022	260	330	6.5	30	30	12	<0.5	21	14	67	67	30	11	<5	2,000	2,000	<1	<0.1	<1	-	46	<1	<0.05	10	<1	3	85	<1	<1	<1	<1	<10	<50	<10	<50	<100	<100	<100	ND*	<0.2
QC Samples																																									
Duplicate Samples																																									
MW2-210922		340	490	6.5	57	35	12	0.7	46	16	100	100	45	130	8	1100	1,200	<1	<0.1	<1	-	3	<1	<0.05	7	<1	<1	15	<1	<1	<1	<1	<10	<50	<10	<50	<100	<100	<100	ND*	<0.2
DUP1-210922	21/09/2022	*340*	*490*	*6.5*	*57*	*36*	*12*	*0.7*	*49*	*16*	*97*	*97*	45	130	7	*1200*	*1,200*	*<1*	*<0.1*	*<1*	-	*4*	*<1*	*<0.05*	*6*	*<1*	*1*	*16*	*<1*	*<1*	*<1*	*<1*	*<10*	*<50*	*<10*	*<50*	*<100*	*<100*	*<100*	*ND**	<0.2
Intralab RPD		0%	0%	0%	0%	3%	0%	0%	6%	0%	3%	3%	0%	0%	13%	9%	0%	BL	BL	BL	-	29%	BL	BL	15%	BL	BL	6%	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	0%

Notes

	A blank space indicates no test performed, or no criteria available
22	Underscored Value Indicates exceedance of Vapour Intrusion Criteria
22	Indicates an exceedance of the adopted beneficial use criteria
22	Indicates an exceedance of the aesthetic criteria
ND*	None detected at concentrations above the laboratory reporting limit (<1 - <10 µg/L)
LR	Limit of Reporting Increased
22	Blue shaded cell indicates the RPD for INTRALAB sample pair is greater than the adopted 50% criterion

1: ANZECC (2000 revised 2018) National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. 95% trigger values for freshwater.
2: NHMRC/NRMMC (2011 updated August 2018) National Water Quality Management Strategy. Australian Drinking Water Guidelines (# denotes aesthetic criteria).
3: ANZECC (2000 revised 2018)) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Water Quality for Irrigation and General Water Use – Long-term Trigger Values. Unless otherwise specified.
4: ANZECC (2000 revised 2018) National Water Quality Management Strategy. Australian Water Quality Guidelines for Fresh and Marine Waters "Livestock Drinking Water" – Unless otherwise specified.
5: NHMRC/NRMMC (2008) Guidelines for Managing Risks in Recreational Water (Health / Aesthetic: # denotes aesthetic criteria). Unless otherwise specified. Adjusted by a factor of 10 in accordance with advice from NHMRC (2008). Adjustment was only applied to non-volatile chemicals.
6: Australian Standard AS2159-2009 Piling Design and Installation.
7: NEPC (2013) Health Screening Levels – for Sand 2 to < 4 m.
7: NEPC (2013) Health Screening Levels – for Sand 2 to < 4 m.
9: US EPA (November 2018) Regional Screening Levels for Tap Water. Adjusted to be consistent with Australian cancer risk policy. Adjusted by a factor of 10 in accordance with advice from NHMRC (2008)
10: ANZECC (2000 revised 2018) National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Fresh water Low Reliability Trigger Levels.
11: WHO (2005a). Note the values are based on health effects via ingestion and do not include aesthetic effects
12: US EPA (2003) Region 5 Ecological Screening Levels
13: Guideline for chromium VI adopted.
14: Netherlands (2009) Circular on Target Values and Intervention Values for Soil Remediation. Ministry of Housing, Spatial Planning and the Environment, Netherlands Government (Groundwater Intervention Value).
15: CCME (2007) Canadian Water Quality Guidelines for the Protection of Aquatic Life/Agriculture - Freshwater or Livestock criteria.
16: EPA Victoria (2021) Environmental Reference Standard Melbourne Australia. Tributaries of the Yarra River 75th percentile value
#: Denotes Aesthetic number. NHMRC/NRMMC (2011 updated 2018) and NHMRC/NRMMC (2008).

Appendix F

Laboratory Reports and Chain of Custody Documentation

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.01	**Suburb:**	Wollert	**To:**	Envirolab Services
Project Manager:	James Curtis	**Order Number:**		**Sampler:**	FS		22 Research Drive, Croydon VIC 3136
Email:	Jim.Curtis@douglaspartners.com.au, felix.smalley@douglaspartners.com.au					**Attn:**	Pamela Adams
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day					**Contact:**	(03) 9763 2500 melbourne@envirolab.com.au
Prior Storage:	☑ Fridge ☐ Freezer ☐ Shelf	**Do samples contain 'potential' HBM?**	☐ No ☑ Yes (If YES, then handle, transport and store in accordance with FPM HAZID)				

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water	Container Type: G - glass P - plastic	Analytes: EPA 1828.2 Table 3 Screen	Metals, TRH, PAH		Asbestos Presence/absence							Notes/ Preservation/ Additional Requirements
1	SS1			13.09.22	S	G		X									
2	SS2			13.09.22	S	G		X									
3	SS3			13.09.22	S	G		X									
4	HA01-0.0	0	0.1	13.09.22	S	G	X										
5	HA02-0.0	0	0.1	13.09.22	S	G	X										
6	HA03-0.0	0	0.1	13.09.22	S	G		X									
7	HA03-0.4	0.4	0.5	13.09.22	S	G											
8	HA03-0.7	0.7	0.8	13.09.22	S	G											
9	HA03-0.9	0.9	1	13.09.22	S	G											
10	HA04-0.0	0	0.1	13.09.22	S	G		X									
11	HA05-0.0	0	0.1	13.09.22	S	G		X									
12	HA05-0.4	0.4	0.5	13.09.22	S	G											
13	HA06-0.0	0	0.1	13.09.22	S	G		X									
14	HA07-0.0	0	0.1	13.09.22	S	G		X									

ENVIROLAB 25 Research Drive Croydon South VIC 3136 Ph: (03) 9763 2500
Job No: 33623
Date Received: 15/09/22
Time Received: 10.20am
Received by: CR
Temp: Cool / Ambient 6.2c
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:	As, Cd, total Cr, Cu, Pb, Hg, Mo, Ni, Sn, Se, Ag, Zn		
Number of samples in container:		**Transported to laboratory by:**	Envirolab Courier
Send results to:	Douglas Partners Pty Ltd		
Address:	231 Normanby Road, South Melbourne VIC	**Phone:**	(03) 9673 3500
Relinquished by:	FS	**Date:**	15.09.22
		Signed:	

LAB RECEIPT
Lab Ref. No: 33623
Received by: CR
Date & Time: 15/09/22 10.20am
Signed:

COC received 5.26pm 15/9/22

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CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.01	**Suburb:**	Wollert	**To:**	*Envirolab Services*
Project Manager:	James Curtis	**Order Number:**		**Dispatch date:**	15.09.22
					22 Research Drive, Croydon VIC 3136

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water	G - glass P - plastic	EPA 1828.2 Table 3 Screen	Metals, TRH, PAH		Asbestos Presence/absence							
15	HA08-0.0	0	0.1	13.09.22	S	G		X									
16	HA09-0.0	0	0.1	13.09.22	S	G		X									
17	HA10-0.0	0	0.1	13.09.22	S	G		X									
18	TP15-0.05	0.05	0.15	14.09.22	S	G		X									
19	TP15-0.6	0.6	0.7	14.09.22	S	G											
20	TP16-0.05	0.05	0.15	14.09.22	S	G		X									
21	TP16-0.8	0.8	0.9	14.09.22	S	G											
22	TP17-0.05	0.05	0.15	14.09.22	S	G											
23	TP17-0.4	0.4	0.5	14.09.22	S	G		X									
24	TP17-1.6	1.6	1.7	14.09.22	S	G											
25	TP18-0.05	0.05	0.15	14.09.22	S	G		X									
26	TP19-0.05	0.05	0.15	14.09.22	S	G											
27	TP19-1.0	1	1.1	14.09.22	S	G		X									
28	TP20-0.05	0.05	0.15	14.09.22	S	G		X									
29	TP20-0.8	0.8	0.9	14.09.22	S	G											
30	TP21-0.05	0.05	0.15	14.09.22	S	G		X									
31	TP21-0.4	0.4	0.5	14.09.22	S	G											
32	TP22-0.05	0.05	0.15	14.09.22	S	G		X									

Douglas Partners
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CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.01	**Suburb:** Wollert	**To:** *Envirolab Services*
Project Manager:	231 Normanby Road, South Melbourn		**Dispatch date:**

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes											Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water	G - glass P - plastic	EPA 1828.2 Table 3 Screen	Metals, TRH, PAH		Asbestos Presence/absence								
33	TP23-0.05	0.05	0.15	14.09.22	S	G												
34	TP23-0.5	0.5	0.6	14.09.22	S	G		X										
35	TP23-1.7	1.7	1.8	14.09.22	S	G												
36	TP24-0.05	0.05	0.15	14.09.22	S	G		X										
37	TP24-0.6	0.6	0.7	14.09.22	S	G												
38	PACM1			13.09.22	-	P				X								
39	PACM2			13.09.22	-	P				X								
40	PACM3			13.09.22	-	P				X								
41	DUP1			14.09.22	S	G		X										
42	TP22-0.5			14/9/22	S													

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 33623

Client Details

Client	Douglas Partners
Attention	Jim Curtis
Address	231 Normanby Road, PO Box 5051, South Melbourne, VIC, 3205

Sample Details

Your Reference	**211616.01 Wollert**
Number of Samples	39 Soil, 3 Material
Date samples received	15/09/2022
Date completed instructions received	15/09/2022

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	26/09/2022
Date of Issue	26/09/2022

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Asbestos Approved By
Analysed by Asbestos Approved Analyst: Nyovan Moonean
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Chris De Luca, Operations Manager
Tara White, Metals Team Leader
Tianna Milburn, Chemist

Authorised By

Pamela Adams, Laboratory Manager

VOCs in soil			
Our Reference		33623-4	33623-5
Your Reference	UNITS	HA01-0.0	HA02-0.0
Depth		0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022
Type of sample		Soil	Soil
Date extracted	-	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022
Vinyl Chloride	mg/kg	<0.1	<0.1
1,1-Dichloroethene	mg/kg	<0.1	<0.1
methylene chloride	mg/kg	<0.5	<0.5
trans-1,2-dichloroethene	mg/kg	<0.1	<0.1
cis-1,2-dichloroethene	mg/kg	<0.1	<0.1
chloroform	mg/kg	<0.1	<0.1
1,1,1-trichloroethane	mg/kg	<0.1	<0.1
carbon tetrachloride	mg/kg	<0.1	<0.1
Benzene	mg/kg	<0.1	<0.1
1,2-dichloroethane	mg/kg	<0.1	<0.1
trichloroethene	mg/kg	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1
1,1,2-trichloroethane	mg/kg	<0.1	<0.1
tetrachloroethene	mg/kg	<0.1	<0.1
chlorobenzene	mg/kg	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1
1,1,1,2-tetrachloroethane	mg/kg	<0.1	<0.1
m+p-xylene	mg/kg	<0.2	<0.2
o-Xylene	mg/kg	<0.1	<0.1
styrene	mg/kg	<0.1	<0.1
1,1,2,2-tetrachloroethane	mg/kg	<0.1	<0.1
1,4-dichlorobenzene	mg/kg	<0.1	<0.1
1,2-dichlorobenzene	mg/kg	<0.1	<0.1
1,2,4-trichlorobenzene	mg/kg	<0.1	<0.1
hexachlorobutadiene	mg/kg	<0.1	<0.1
Total +ve MAHs	mg/kg	<7	<7
Total +ve Chlorinated Hydrocarbons	mg/kg	<0.1	<0.1
Total +ve Other Chlorinated Hydrocarbons	mg/kg	<0.1	<0.1
Surrogate aaa-Trifluorotoluene	%	99	97
Surrogate Dibromofluoromethane	%	100	99
Surrogate Toluene-d_8	%	100	99
Surrogate 4-Bromofluorobenzene	%	101	101

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		33623-1	33623-2	33623-3	33623-4	33623-5
Your Reference	UNITS	SP1	SP2	SP3	HA01-0.0	HA02-0.0
Depth		-	-	-	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	103	101	105	103

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		33623-6	33623-10	33623-11	33623-13	33623-14
Your Reference	UNITS	HA03-0.0	HA04-0.0	HA05-0.0	HA06-0.0	HA07-0.0
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	101	99	99	100

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		33623-15	33623-16	33623-17	33623-18	33623-20
Your Reference	UNITS	HA08-0.0	HA09-0.0	HA10-0.0	TP15-0.05	TP16-0.05
Depth		0-0.1	0-0.1	0-0.1	0.05-0.15	0.05-0.15
Date Sampled		13/09/2022	13/09/2022	13/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	102	105	102	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		33623-23	33623-25	33623-27	33623-28	33623-30
Your Reference	UNITS	TP17-0.4	TP18-0.05	TP19-1.0	TP20-0.05	TP21-0.05
Depth		0.4-0.5	0.05-0.15	1-1.1	0.05-0.15	0.05-0.15
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	107	101	102	102

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		33623-32	33623-34	33623-36	33623-41
Your Reference	UNITS	TP22-0.05	TP23-0.5	TP24-0.05	DUP1
Depth		0.05-0.15	0.5-0.6	0.05-0.15	-
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1
Total BTEX	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	102	102	99

TRH Soil C10-C40 NEPM						
Our Reference		33623-1	33623-2	33623-3	33623-4	33623-5
Your Reference	UNITS	SP1	SP2	SP3	HA01-0.0	HA02-0.0
Depth		-	-	-	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	92	91	92	92	91

TRH Soil C10-C40 NEPM						
Our Reference		33623-6	33623-10	33623-11	33623-13	33623-14
Your Reference	UNITS	HA03-0.0	HA04-0.0	HA05-0.0	HA06-0.0	HA07-0.0
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	94	85	85	87	85

TRH Soil C10-C40 NEPM						
Our Reference		33623-15	33623-16	33623-17	33623-18	33623-20
Your Reference	UNITS	HA08-0.0	HA09-0.0	HA10-0.0	TP15-0.05	TP16-0.05
Depth		0-0.1	0-0.1	0-0.1	0.05-0.15	0.05-0.15
Date Sampled		13/09/2022	13/09/2022	13/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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	130	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	130	<50	<50	<50	<50
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	170	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	170	<50	<50	<50	<50
Surrogate o-Terphenyl	%	86	83	91	89	88

TRH Soil C10-C40 NEPM						
Our Reference		33623-23	33623-25	33623-27	33623-28	33623-30
Your Reference	UNITS	TP17-0.4	TP18-0.05	TP19-1.0	TP20-0.05	TP21-0.05
Depth		0.4-0.5	0.05-0.15	1-1.1	0.05-0.15	0.05-0.15
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	87	84	86	95	120

TRH Soil C10-C40 NEPM					
Our Reference		33623-32	33623-34	33623-36	33623-41
Your Reference	UNITS	TP22-0.05	TP23-0.5	TP24-0.05	DUP1
Depth		0.05-0.15	0.5-0.6	0.05-0.15	-
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
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	%	128	98	110	118

PAHs in Soil						
Our Reference		33623-1	33623-2	33623-3	33623-4	33623-5
Your Reference	UNITS	SP1	SP2	SP3	HA01-0.0	HA02-0.0
Depth		-	-	-	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	20/09/2022	20/09/2022
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-d_{14}	%	118	114	116	112	118

PAHs in Soil						
Our Reference		33623-6	33623-10	33623-11	33623-13	33623-14
Your Reference	UNITS	HA03-0.0	HA04-0.0	HA05-0.0	HA06-0.0	HA07-0.0
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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-d_{14}	%	116	110	112	112	108

PAHs in Soil						
Our Reference		33623-15	33623-16	33623-17	33623-18	33623-20
Your Reference	UNITS	HA08-0.0	HA09-0.0	HA10-0.0	TP15-0.05	TP16-0.05
Depth		0-0.1	0-0.1	0-0.1	0.05-0.15	0.05-0.15
Date Sampled		13/09/2022	13/09/2022	13/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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-d_{14}	%	112	110	114	94	112

PAHs in Soil						
Our Reference		33623-23	33623-25	33623-27	33623-28	33623-30
Your Reference	UNITS	TP17-0.4	TP18-0.05	TP19-1.0	TP20-0.05	TP21-0.05
Depth		0.4-0.5	0.05-0.15	1-1.1	0.05-0.15	0.05-0.15
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
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	0.2
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
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	0.11
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	0.87
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-d_{14}	%	112	112	118	112	118

PAHs in Soil					
Our Reference		33623-32	33623-34	33623-36	33623-41
Your Reference	UNITS	TP22-0.05	TP23-0.5	TP24-0.05	DUP1
Depth		0.05-0.15	0.5-0.6	0.05-0.15	-
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<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
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc (Half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	112	116	116	120

Speciated Phenols in Soil			
Our Reference		33623-4	33623-5
Your Reference	UNITS	HA01-0.0	HA02-0.0
Depth		0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022
Type of sample		Soil	Soil
Date extracted	-	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022
Phenol	mg/kg	<0.2	<0.2
2-Chlorophenol	mg/kg	<0.2	<0.2
2-Methylphenol	mg/kg	<0.2	<0.2
3/4-Methylphenol	mg/kg	<0.4	<0.4
2-Nitrophenol	mg/kg	<0.2	<0.2
2,4-Dimethylphenol	mg/kg	<0.2	<0.2
2,4-Dichlorophenol	mg/kg	<0.05	<0.05
2,6-Dichlorophenol	mg/kg	<0.05	<0.05
2,4,5-Trichlorophenol	mg/kg	<0.05	<0.05
2,4,6-Trichlorophenol	mg/kg	<0.05	<0.05
2,4-Dinitrophenol	mg/kg	<4	<4
4-Nitrophenol	mg/kg	<4	<4
2,3,4,6-Tetrachlorophenol	mg/kg	<0.1	<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg	<2	<2
Pentachlorophenol	mg/kg	<0.1	<0.1
4-Chloro-3-Methylphenol	mg/kg	<0.2	<0.2
2,3,4,5-Tetrachlorophenol	mg/kg	<0.1	<0.1
2,3,5,6-Tetrachlorophenol	mg/kg	<0.1	<0.1
2-Cyclohexyl-4,6-Dinitrophenol	mg/kg	<20	<20
Dinoseb	mg/kg	<5	<5
Total +ve Phenols Halogenated	mg/kg	<1	<1
Total +ve Phenols non-Halogenated	mg/kg	<50	<50
Surrogate Phenol-d_6	%	92	94
Surrogate 2-fluorophenol	%	90	90

Organochlorine Pesticides in soil			
Our Reference		33623-4	33623-5
Your Reference	UNITS	HA01-0.0	HA02-0.0
Depth		0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022
Type of sample		Soil	Soil
Date extracted	-	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022
alpha-BHC	mg/kg	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve Organochlorine Pesticides	mg/kg	<0.1	<0.1
Total +ve report other OC	mg/kg	<0.1	<0.1
Tot +ve report Chlordane	mg/kg	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	92	92

PCBs in Soil			
Our Reference		33623-4	33623-5
Your Reference	UNITS	HA01-0.0	HA02-0.0
Depth		0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022
Type of sample		Soil	Soil
Date extracted	-	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate 2-fluorobiphenyl	%	92	92

Metals in soil						
Our Reference		33623-1	33623-2	33623-3	33623-4	33623-5
Your Reference	UNITS	SP1	SP2	SP3	HA01-0.0	HA02-0.0
Depth		-	-	-	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Arsenic	mg/kg	<4	4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	24	30	29	19	30
Copper	mg/kg	12	15	15	30	24
Lead	mg/kg	17	15	11	<1	12
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	9	18	16	170	47
Tin	mg/kg	1	2	1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	24	32	18	34	39

Metals in soil						
Our Reference		33623-6	33623-10	33623-11	33623-13	33623-14
Your Reference	UNITS	HA03-0.0	HA04-0.0	HA05-0.0	HA06-0.0	HA07-0.0
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	47	78	47	35
Copper	mg/kg	31	11	16	11	8
Lead	mg/kg	10	12	9	10	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	85	21	21	27	23
Tin	mg/kg	<1	<1	<1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	48	22	22	20	14

Metals in soil						
Our Reference		33623-15	33623-16	33623-17	33623-18	33623-20
Your Reference	UNITS	HA08-0.0	HA09-0.0	HA10-0.0	TP15-0.05	TP16-0.05
Depth		0-0.1	0-0.1	0-0.1	0.05-0.15	0.05-0.15
Date Sampled		13/09/2022	13/09/2022	13/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Arsenic	mg/kg	<4	<4	<4	<4	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	51	22	41	43	27
Copper	mg/kg	25	12	17	15	9
Lead	mg/kg	15	16	7	11	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	28	13	24	40	12
Tin	mg/kg	<1	1	<1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	40	29	22	20	13

Metals in soil						
Our Reference		33623-23	33623-25	33623-27	33623-28	33623-30
Your Reference	UNITS	TP17-0.4	TP18-0.05	TP19-1.0	TP20-0.05	TP21-0.05
Depth		0.4-0.5	0.05-0.15	1-1.1	0.05-0.15	0.05-0.15
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Arsenic	mg/kg	6	5	5	6	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	9	55	54	25
Copper	mg/kg	8	5	29	34	10
Lead	mg/kg	14	11	15	12	26
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	12	8	67	73	14
Tin	mg/kg	<1	<1	1	1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	12	6	48	40	30

Metals in soil					
Our Reference		33623-32	33623-34	33623-36	33623-41
Your Reference	UNITS	TP22-0.05	TP23-0.5	TP24-0.05	DUP1
Depth		0.05-0.15	0.5-0.6	0.05-0.15	-
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil
Date digested	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Arsenic	mg/kg	6	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	29	37	30	46
Copper	mg/kg	13	19	20	23
Lead	mg/kg	15	8	4	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1
Nickel	mg/kg	13	43	50	53
Tin	mg/kg	<1	<1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1
Zinc	mg/kg	21	23	27	26

Miscellaneous Inorg - soil			
Our Reference		33623-4	33623-5
Your Reference	UNITS	HA01-0.0	HA02-0.0
Depth		0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022
Type of sample		Soil	Soil
Date prepared	-	20/09/2022	20/09/2022
Date analysed	-	20/09/2022	20/09/2022
Total Cyanide	mg/kg	<0.5	<0.5
Hexavalent Chromium, Cr^{6+}	mg/kg	<1	<1
Total Fluoride	mg/kg	210	170
pH 1:5 soil:water	pH Units	8.3	9.2

Moisture						
Our Reference		33623-1	33623-2	33623-3	33623-4	33623-5
Your Reference	UNITS	SP1	SP2	SP3	HA01-0.0	HA02-0.0
Depth		-	-	-	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Moisture	%	14	17	20	17	21

Moisture						
Our Reference		33623-6	33623-10	33623-11	33623-13	33623-14
Your Reference	UNITS	HA03-0.0	HA04-0.0	HA05-0.0	HA06-0.0	HA07-0.0
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		13/09/2022	13/09/2022	13/09/2022	13/09/2022	13/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Moisture	%	14	26	26	26	24

Moisture						
Our Reference		33623-15	33623-16	33623-17	33623-18	33623-20
Your Reference	UNITS	HA08-0.0	HA09-0.0	HA10-0.0	TP15-0.05	TP16-0.05
Depth		0-0.1	0-0.1	0-0.1	0.05-0.15	0.05-0.15
Date Sampled		13/09/2022	13/09/2022	13/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Moisture	%	34	20	19	20	18

Moisture						
Our Reference		33623-23	33623-25	33623-27	33623-28	33623-30
Your Reference	UNITS	TP17-0.4	TP18-0.05	TP19-1.0	TP20-0.05	TP21-0.05
Depth		0.4-0.5	0.05-0.15	1-1.1	0.05-0.15	0.05-0.15
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Moisture	%	17	5.8	14	27	19

Moisture					
Our Reference		33623-32	33623-34	33623-36	33623-41
Your Reference	UNITS	TP22-0.05	TP23-0.5	TP24-0.05	DUP1
Depth		0.05-0.15	0.5-0.6	0.05-0.15	-
Date Sampled		14/09/2022	14/09/2022	14/09/2022	14/09/2022
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	20/09/2022	20/09/2022	20/09/2022	20/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Moisture	%	17	22	20	23

Asbestos ID - materials				
Our Reference		33623-38	33623-39	33623-40
Your Reference	UNITS	PACM1	PACM2	PACM3
Depth		-	-	-
Date Sampled		13/09/2022	13/09/2022	13/09/2022
Type of sample		Material	Material	Material
Date analysed	-	20/09/2022	20/09/2022	20/09/2022
Mass / Dimension of Sample	-	48x41x6mm	63x35x4mm	58x30x4mm
Sample Description	-	Beige fibre cement material	Beige fibre cement material	Beige fibre cement material
Asbestos ID in materials	-	No asbestos detected Organic Fibres detected	No asbestos detected Organic Fibres detected	No asbestos detected Organic Fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

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-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Inorg-014	Cyanide - free, total, weak acid dissociable by segmented flow analyser (in line dialysis with colourimetric finish). Solids/Filters and sorbents are extracted in a caustic media prior to analysis. Impingers are pH adjusted as required prior to analysis. Cyanides amenable to Chlorination - samples are analysed untreated and treated with hypochlorite to assess the potential for chlorination of cyanide forms. Based on APHA latest edition, 4500-CN_G,H. Please note:- i) The amenable to Chlorination test is only carried out for solids where the Total Cyanide result is >50mg/kg. The Category D/industrial waste upper limit for Total Concentrations of Cyanide (amenable) is 300mg/kg (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (250mg/kg) is to accommodate analytical uncertainty. ii) The amenable to Chlorination test is only carried out for leachates where the Total Cyanide result is >1mg/L. The Category D/industrial waste upper limit for Leachable Concentrations of Cyanide (amenable) is 1.75mg/L (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (1mg/L) is to accommodate analytical uncertainty
Inorg-026/53	Fluoride by caustic fusion and determined by ion selective electrode (ISE) analysis.
INORG-118	Hexavalent Chromium by Ion Chromatographic separation and colourimetric determination.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	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. 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).

Method ID	Methodology Summary
Org-021/022	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. 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	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs 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	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, the Total +ve Cresols or Phenols PQL is reflective of the lowest individual PQL and is therefore" Total +ve Cresols or Phenols" is simply a sum of the positive individual Cresols or Phenols.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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. 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: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Date analysed	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Vinyl Chloride	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
methylene chloride	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,2-dichloroethene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
chloroform	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
1,1,1-trichloroethane	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
carbon tetrachloride	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
trichloroethene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Toluene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
tetrachloroethene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
chlorobenzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,1,2-tetrachloroethane	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
o-Xylene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
styrene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
hexachlorobutadiene	mg/kg	0.1	Org-023	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	106	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate Dibromofluoromethane	%		Org-023	100	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate Toluene-d_8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33623-13
Date extracted	-			20/09/2022	11	20/09/2022	20/09/2022		20/09/2022	20/09/2022
Date analysed	-			20/09/2022	11	20/09/2022	20/09/2022		20/09/2022	20/09/2022
vTRH C_6 - C_9	mg/kg	25	Org-023	<25	11	<25	<25	0	99	99
vTRH C_6 - C_{10}	mg/kg	25	Org-023	<25	11	<25	<25	0	99	99
Benzene	mg/kg	0.2	Org-023	<0.2	11	<0.2	<0.2	0	97	96
Toluene	mg/kg	0.5	Org-023	<0.5	11	<0.5	<0.5	0	103	102
Ethylbenzene	mg/kg	1	Org-023	<1	11	<1	<1	0	100	99
m+p-xylene	mg/kg	2	Org-023	<2	11	<2	<2	0	98	98
o-Xylene	mg/kg	1	Org-023	<1	11	<1	<1	0	98	98
Naphthalene	mg/kg	1	Org-023	<1	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	112	11	99	102	3	108	99

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			[NT]	27	20/09/2022	20/09/2022		20/09/2022	[NT]
Date analysed	-			[NT]	27	20/09/2022	20/09/2022		20/09/2022	[NT]
vTRH C_6 - C_9	mg/kg	25	Org-023	[NT]	27	<25	<25	0	103	[NT]
vTRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	27	<25	<25	0	103	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	27	<0.2	<0.2	0	100	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	27	<0.5	<0.5	0	106	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	27	<1	<1	0	103	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	27	<2	<2	0	102	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	27	<1	<1	0	101	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	27	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	27	101	104	3	110	[NT]

QUALITY CONTROL: TRH Soil C10-C40 NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33623-14
Date extracted	-			20/09/2022	11	20/09/2022	20/09/2022		20/09/2022	20/09/2022
Date analysed	-			20/09/2022	11	21/09/2022	21/09/2022		20/09/2022	21/09/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	11	<50	<50	0	92	86
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	11	<100	<100	0	102	92
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	11	<100	100	0	107	98
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	11	<50	<50	0	92	86
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	11	<100	<100	0	102	92
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	11	<100	<100	0	107	98
Surrogate o-Terphenyl	%		Org-020	95	11	85	87	2	86	81

QUALITY CONTROL: TRH Soil C10-C40 NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			[NT]	27	20/09/2022	20/09/2022		20/09/2022	[NT]
Date analysed	-			[NT]	27	21/09/2022	21/09/2022		21/09/2022	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	27	<50	<50	0	93	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	27	<100	<100	0	98	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	27	<100	<100	0	107	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	27	<50	<50	0	93	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	27	<100	<100	0	98	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	27	<100	<100	0	107	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	27	86	116	30	83	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33623-14
Date extracted	-			20/09/2022	11	20/09/2022	20/09/2022		20/09/2022	20/09/2022
Date analysed	-			20/09/2022	11	21/09/2022	21/09/2022		20/09/2022	21/09/2022
Naphthalene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	104	106
Acenaphthylene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	108	102
Fluorene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	106	108
Phenanthrene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	112	103
Anthracene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	118	108
Pyrene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	124	109
Benzo(a)anthracene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	102	102
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	<0.2	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	<0.05	11	<0.05	<0.05	0	112	118
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	<0.1	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	114	11	112	110	2	112	108

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			[NT]	27	20/09/2022	20/09/2022		20/09/2022	[NT]
Date analysed	-			[NT]	27	21/09/2022	21/09/2022		21/09/2022	[NT]
Naphthalene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	108	[NT]
Acenaphthylene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	104	[NT]
Fluorene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	108	[NT]
Phenanthrene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	108	[NT]
Anthracene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	116	[NT]
Pyrene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	118	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	106	[NT]
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	[NT]	27	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	[NT]	27	<0.05	<0.05	0	122	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	[NT]	27	118	114	3	110	[NT]

QUALITY CONTROL: Speciated Phenols in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Date analysed	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Phenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	106	[NT]
2-Chlorophenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
2-Methylphenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	96	[NT]
3/4-Methylphenol	mg/kg	0.4	Org-022	<0.4	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-Nitrophenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dimethylphenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dichlorophenol	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,6-Dichlorophenol	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
2,4,5-Trichlorophenol	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4,6-Trichlorophenol	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dinitrophenol	mg/kg	4	Org-022	<4	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-Nitrophenol	mg/kg	4	Org-022	<4	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,3,4,6-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-Methyl-4,6-Dinitrophenol	mg/kg	2	Org-022	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Pentachlorophenol	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
4-Chloro-3-Methylphenol	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,3,4,5-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,3,5,6-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-Cyclohexyl-4,6-Dinitrophenol	mg/kg	20	Org-022	<20	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dinoseb	mg/kg	5	Org-022	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Phenol-d_6	%		Org-022	86	[NT]	[NT]	[NT]	[NT]	90	[NT]
Surrogate 2-fluorophenol	%		Org-022	88	[NT]	[NT]	[NT]	[NT]	88	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Date analysed	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
alpha-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Hexachlorobenzene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
gamma-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
delta-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
alpha-chlordane	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Dieldrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Endrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Methoxychlor	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	90	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Date analysed	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Aroclor 1016	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Aroclor 1260	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-fluorobiphenyl	%		Org-022	94	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: Metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33623-28
Date digested	-			20/09/2022	11	20/09/2022	20/09/2022		20/09/2022	20/09/2022
Date analysed	-			21/09/2022	11	21/09/2022	21/09/2022		21/09/2022	21/09/2022
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	11	<4	<4	0	109	92
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	11	<0.4	<0.4	0	110	92
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	11	78	72	8	109	115
Copper	mg/kg	1	Metals-020 ICP-AES	<1	11	16	17	6	109	104
Lead	mg/kg	1	Metals-020 ICP-AES	<1	11	9	9	0	110	85
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	11	<0.1	<0.1	0	92	88
Molybdenum	mg/kg	1	Metals-020 ICP-AES	<1	11	<1	<1	0	106	79
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	11	21	22	5	110	108
Tin	mg/kg	1	Metals-020 ICP-AES	<1	11	<1	<1	0	103	87
Selenium	mg/kg	2	Metals-020 ICP-AES	<2	11	<2	<2	0	106	83
Silver	mg/kg	1	Metals-020 ICP-AES	<1	11	<1	<1	0	104	103
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	11	22	24	9	110	94

QUALITY CONTROL: Metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date digested	-			[NT]	27	20/09/2022	20/09/2022		20/09/2022	[NT]
Date analysed	-			[NT]	27	21/09/2022	21/09/2022		21/09/2022	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	[NT]	27	5	7	33	110	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	[NT]	27	<0.4	<0.4	0	109	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	[NT]	27	55	53	4	109	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	[NT]	27	29	26	11	108	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	[NT]	27	15	17	12	111	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	[NT]	27	<0.1	<0.1	0	98	[NT]
Molybdenum	mg/kg	1	Metals-020 ICP-AES	[NT]	27	<1	<1	0	107	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	[NT]	27	67	45	39	110	[NT]
Tin	mg/kg	1	Metals-020 ICP-AES	[NT]	27	1	<1	0	103	[NT]
Selenium	mg/kg	2	Metals-020 ICP-AES	[NT]	27	<2	<2	0	107	[NT]
Silver	mg/kg	1	Metals-020 ICP-AES	[NT]	27	<1	<1	0	104	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	[NT]	27	48	44	9	110	[NT]

QUALITY CONTROL: Miscellaneous Inorg - soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Date analysed	-			20/09/2022	[NT]	[NT]	[NT]	[NT]	20/09/2022	[NT]
Total Cyanide	mg/kg	0.5	Inorg-014	<0.5	[NT]	[NT]	[NT]	[NT]	108	[NT]
Hexavalent Chromium, Cr^{6+}	mg/kg	1	INORG-118	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Total Fluoride	mg/kg	50	Inorg-026/53	<50	[NT]	[NT]	[NT]	[NT]	78	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	99	[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.

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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.

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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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

Asbestos analysed by ELS Sydney, report number 306030

Free Ice Water was found to be surrounding samples within the esky(ies) provided, there is the potential for cross contamination.

Envirolab Services Pty Ltd
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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 33623-A

Client Details

Client	Douglas Partners
Attention	Felix Smalley
Address	231 Normanby Road, PO Box 5051, South Melbourne, VIC, 3205

Sample Details

Your Reference	**211616.01 Wollert**
Number of Samples	39 Soil, 3 Material
Date samples received	15/09/2022
Date completed instructions received	27/09/2022

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	04/10/2022
Date of Issue	28/09/2022

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

Results Approved By
Tara White, Metals Team Leader

Authorised By

Pamela Adams, Laboratory Manager

Metals from Leaching Fluid pH 5.0			
Our Reference		33623-A-4	33623-A-28
Your Reference	UNITS	HA01-0.0	TP20-0.05
Depth		0-0.1	0.05-0.15
Date Sampled		13/09/2022	14/09/2022
Type of sample		Soil	Soil
Date extracted	-	27/09/2022	27/09/2022
Date analysed	-	28/09/2022	28/09/2022
pH of final Leachate	pH units	4.9	4.9
Nickel	mg/L	0.2	0.05

Method ID	Methodology Summary
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.
Metals-020	Determination of various metals by ICP-OES following leaching using Acetate buffer pH 5.0, i.e. Leaching fluid pH 5.0 = CLASS 2 & 3 from AS 4439.3.

QUALITY CONTROL: Metals from Leaching Fluid pH 5.0						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33623-A-28
Date extracted	-			27/09/2022	4	27/09/2022	27/09/2022		27/09/2022	27/09/2022
Date analysed	-			28/09/2022	4	28/09/2022	28/09/2022		28/09/2022	28/09/2022
Nickel	mg/L	0.02	Metals-020	<0.02	4	0.2	0.1	67	116	115

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Report Comments

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CERTIFICATE OF ANALYSIS

Batch No: **22-68201**
Final Report 35264

Client: **Douglas Partners Pty Ltd**
Contact: **Jim Curtis**
Address: 231 Normanby Road
SOUTH MELBOURNE
VIC 3205
AUSTRALIA

Client Program Ref: **211616-01 Wollert**
ALS Program Ref: **DOUGLAS**
PO No: **ME220682**

Laboratory Scoresby Laboratory
Address Caribbean Business Park, 22 Dalmore Drive, Scoresby, VIC 3179
Phone 03 8756 8000
Fax 03 9763 1862
Contact: Tuyen Nguyen
Client Manager
Tuyen.Nguyen@alsglobal.com

Date Sampled: 14-Sep-2022
Date Samples Received: 16-Sep-2022
Date Issued: **27-Sep-2022**

The hash (#) below indicates methods not covered by NATA accreditation in the performance of this service .

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
MS Total Metals	WG020B		**PAH**	WP075B		**TRH F2**	# WP071	
TRH & TPH (>C10)	WP071		**TRH (C6-C10) & F1**	WP074 (F1 not NATA)				

Measurement Uncertainties values for your compliance results are available at this link

Samples not collected by ALS and are tested as received.

A blank space indicates no test performed. Soil microbiological testing was commenced within 4 days from the day collected unless otherwise stated.

Calculated results are based on raw data.

Name	*Title*	*Name*	*Title*
Alan Chung	**Team Leader Metals**	**Hao Zhang**	**Team Leader Organics**
Kosta Christopoulos	**Deputy Team Leader Organics**		

Batch No: **22-68201**
Report Number: **35264**
Client: **Douglas Partners Pty Ltd**
Client Program Ref: **211616-01 Wollert**

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	7742377
				Client Sample ID	DUP2
				Sample Date	14/09/22
				Sample Type	SOIL
Analysis	**Analyte**	**CAS #**	**LOR**		
PAH	Acenaphthene	83-32-9	<0.1	mg/kg	<0.1
PAH	Acenaphthylene	208-96-8	<0.1	mg/kg	<0.1
PAH	Anthracene	120-12-7	<0.1	mg/kg	<0.1
PAH	Benz(a)anthracene	56-55-3	<0.1	mg/kg	<0.1
PAH	Benzo(a)pyrene	50-32-8	<0.1	mg/kg	<0.1
PAH	Benzo(b)fluoranthene	205-99-2	<0.1	mg/kg	<0.1
PAH	Benzo(g,h,i)perylene	191-24-2	<0.1	mg/kg	<0.1
PAH	Benzo(k)fluoranthene	207-08-9	<0.1	mg/kg	<0.1
PAH	Chrysene	218-01-9	<0.1	mg/kg	<0.1
PAH	Dibenz(a,h)anthracene	53-70-3	<0.1	mg/kg	<0.1
PAH	Fluoranthene	206-44-0	<0.1	mg/kg	<0.1
PAH	Fluorene	86-73-7	<0.1	mg/kg	<0.1
PAH	Indeno(1,2,3-cd)pyrene	193-39-5	<0.1	mg/kg	<0.1
PAH	Naphthalene	91-20-3	<0.1	mg/kg	<0.1
PAH	Phenanthrene	85-01-8	<0.1	mg/kg	<0.1
PAH	Pyrene	129-00-0	<0.1	mg/kg	<0.1
PAH	Total PAH	TOTALPAH	<0.1	mg/kg	<0.1
PAH	BaP TEQ (zero)	BaP_TEQ_0	<0.1	mg/kg	<0.1
PAH	BaP TEQ (half LOR)	BaP_TEQ_0.5	<0.1	mg/kg	<0.1
PAH	BaP TEQ (LOR)	BaP_TEQ_1.0	0.2	mg/kg	<0.1
PAH	p-Terphenyl-d14	1718-51-0		%	106
Analysis	**Analyte**	**CAS #**	**LOR**		
MS Total Metals	Arsenic	7440-38-2	<5	mg/kg	<5
MS Total Metals	Cadmium	7440-43-9	<0.2	mg/kg	<0.2
MS Total Metals	Chromium	7440-47-3	<5	mg/kg	71
MS Total Metals	Copper	7440-50-8	<5	mg/kg	20
MS Total Metals	Lead	7439-92-1	<5	mg/kg	14
MS Total Metals	Mercury	7439-97-6	<0.05	mg/kg	0.11
MS Total Metals	Nickel	7440-02-0	<5	mg/kg	67
MS Total Metals	Zinc	7440-66-6	<5	mg/kg	46
Analysis	**Analyte**	**CAS #**	**LOR**		
TRH (C6-C10) & F	TPHC6-C9	C6-C9	<20	mg/kg	<20
TRH (C6-C10) & F	TRHC6-C10	C6-C10	<20	mg/kg	<20

Batch No: **22-68201**
Report Number: **35264**
Client: **Douglas Partners Pty Ltd**
Client Program Ref: **211616-01 Wollert**

					Sample No.	7742377
					Client Sample ID	DUP2
					Sample Date	14/09/22
					Sample Type	SOIL
	TRH (C6-C10) & F	TRHC6-C10 minus BTEX	F1-BTEX	<20	mg/kg	<20
Analysis	**Analyte**		**CAS #**	**LOR**		
	TRH F2	TRH>C10-C16 minus Naphthalene	F2-	<20	mg/kg	<20
	TRH & TPH (>C10	TPH C10-C14	C10-C14	<20	mg/kg	<20
	TRH & TPH (>C10	TPH C15-C28	C15-C28	<50	mg/kg	<50
	TRH & TPH (>C10	TPH C29-C36	C29-C36	<50	mg/kg	<50
	TRH & TPH (>C10	Sum of TPH C10-C36	C10-C36	<50	mg/kg	<50
	TRH & TPH (>C10	TRH>C10-C16	C10-C16	<20	mg/kg	<20
	TRH & TPH (>C10	TRH>C16-C34	C16-C34	<50	mg/kg	<50
	TRH & TPH (>C10	TRH>C34-C40	C34-C40	<50	mg/kg	<50
	TRH & TPH (>C10	Sum of TRH>C10-C40	C10-C40	<50	mg/kg	<50

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.01	**Suburb:**	Wollert	**To:**	*ALS Water Resources Group*
Project Manager:	James Curtis	**Order Number:**		**Sampler:**	FS		*22 Dalmore Drive, Scoresby VIC 3179*
Email:	Jim.Curtis@douglaspartners.com.au, felix.smalley@douglaspartners.com.au					**Attn:**	*Tuyen Nguyen*
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day					**Contact:**	*(03) 8756 8116 tuyen.nguyen@alsglobal.com*
Prior Storage:	☑ Fridge ☐ Freezer ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ■ Yes	(If YES, then handle, transport and store in accordance with FPM HAZID)			

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water	Container Type: G - glass P - plastic	Analytes: Metals, TRH, PAH										Notes/ Preservation/ Additional Requirements
7742377	DUP2			14.09.22	S	G	X										22-68201

Douglas Partners Pty DOUGLAS
22-68201
TAT 5
22-68201
Customer Reference: 211616.01
Due Dat e: 23/09/2022

ALS Water Resources Group
Received by: CW
Date: 16/09/22 Time: 16:20
ALS WRG Bottles: Yes / No
Samples Intact: Yes / No
Chilled/Preserved: Yes / No
Comments: 12°C

Metals to analyse:	Standard 8	**LAB RECEIPT**	
Number of samples in container:	**Transported to laboratory by:** ALS Courier	**Lab Ref. No:**	
Send results to:	Douglas Partners Pty Ltd	**Received by:**	
Address:	231 Normanby Road, South Melbourne VI **Phone:** (03) 9673 3500	**Date & Time:**	
Relinquished by:	FS **Date:** 15.09.22 **Signed:** F Smalley	**Signed:**	

Recieved 15/9/22 Relinquished 16/9/22 CR

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.01	**Suburb:**	Wollert	**To:**	*Envirolab Services*
Project Manager:	James Curtis	**Order Number:**	ME220688	**Sampler:**	FS		*22 Research Drive, Croydon VIC 3136*
Email:	Jim.Curtis@douglaspartners.com.au, felix.smalley@douglaspartners.com.au				**Attn:**	*Pamela Adams*
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				**Contact:**	*(03) 9763 2500 melbourne@envirolab.com.au*
Prior Storage:	☑ Fridge ☐ Freezer ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes	(If YES, then handle, transport and store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water	Container Type: G - glass P - plastic	Analytes: Metals, mjr cations, mjr anions	TRH, BTEXN, CHC, OCP	NH3, NO2, NO3, Total N	TDS, pH, EC								Notes/ Preservation/ Additional Requirements
1	MW1-210922			21.09.22	W	G/P	X	X	X	X								
2	MW2-210922			21.09.22	W	G/P	X	X	X	X								
3	MW3-210922			21.09.22	W	G/P	X	X	X	X								
4	DUP1-210922			21.09.22	W	G/P	X	X	X	X								

ENVIROLAB
Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph: (03) 9763 2500

Job No: 33705
Date Received: 21/9/22
Time Received: 3:10pm
Received by:
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None
9.8°C

Metals to analyse:	As, Cd, total Cr, Cu, Pb, Hg, Mo, Ni, Sn, Se, Ag, Zn		
Number of samples in container:		**Transported to laboratory by:**	Envirolab Courier
Send results to:	Douglas Partners Pty Ltd		
Address:	231 Normanby Road, South Melbourne VIC	**Phone:**	(03) 9673 3500
Relinquished by:	FS	**Date:**	21.09.22
		Signed:	FSmalley

LAB RECEIPT

Lab Ref. No:	33705
Received by:	L OLSEN
Date & Time:	21/9/22 3:10pm
Signed:	

COC received 3:16pm

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 33705

Client Details

Client	Douglas Partners
Attention	Jim Curtis
Address	231 Normanby Road, PO Box 5051, South Melbourne, VIC, 3205

Sample Details

Your Reference	**211616.01 Wollert**
Number of Samples	4 Water
Date samples received	21/09/2022
Date completed instructions received	21/09/2022

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	30/09/2022
Date of Issue	30/09/2022

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Results Approved By
Chris De Luca, Operations Manager
Tara White, Metals Team Leader
Tianna Milburn, Chemist

Authorised By

Pamela Adams, Laboratory Manager

VHC's in water					
Our Reference		33705-1	33705-2	33705-3	33705-4
Your Reference	UNITS	MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
Date analysed	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1
Bromoform	µg/L	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1

VHC's in water					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
2-chlorotoluene	µg/L	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	107	102	104	104
Surrogate toluene-d8	%	99	98	99	98
Surrogate 4-BFB	%	94	92	93	94

vTRH(C6-C10)/BTEXN in Water					
Our Reference		33705-1	33705-2	33705-3	33705-4
Your Reference	UNITS	MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
Date analysed	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
TRH C_6 - C_9	µg/L	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10
TRH C_6 -C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1
Total +ve Xylenes	µg/L	<1	<1	<1	<1
Total BTEX in water	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	110	105	108	107
Surrogate toluene-d8	%	102	102	103	102
Surrogate 4-BFB	%	96	94	95	96

TRH Water(C10-C40) NEPM					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
Date analysed	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50
Surrogate o-Terphenyl	%	73	74	79	75

OCP in water					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date extracted	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
Date analysed	-	26/09/2022	26/09/2022	26/09/2022	26/09/2022
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2
Surrogate 2-chlorophenol-d4	%	50	64	66	62

HM in water - dissolved					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date prepared	-	27/09/2022	27/09/2022	27/09/2022	27/09/2022
Date analysed	-	27/09/2022	27/09/2022	27/09/2022	27/09/2022
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1
Copper-Dissolved	µg/L	7	3	46	4
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Molybdenum-Dissolved	µg/L	3	<1	<1	<1
Nickel-Dissolved	µg/L	5	7	10	6
Tin-Dissolved	µg/L	2	<1	3	1
Selenium-Dissolved	µg/L	<1	<1	<1	<1
Silver-Dissolved	µg/L	<1	<1	<1	<1
Zinc-Dissolved	µg/L	27	15	85	16

Ion Balance					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date prepared	-	30/09/2022	30/09/2022	30/09/2022	30/09/2022
Date analysed	-	30/09/2022	30/09/2022	30/09/2022	30/09/2022
Calcium - Dissolved	mg/L	16	12	12	12
Potassium - Dissolved	mg/L	1.5	0.7	<0.5	0.7
Sodium - Dissolved	mg/L	39	46	21	49
Magnesium - Dissolved	mg/L	14	16	14	16
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	130	100	67	97
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	130	100	67	97
Sulphate, SO4	mg/L	18	35	30	36
Chloride, Cl	mg/L	47	57	30	57
Hardness	mgCaCO 3 /L	98	94	89	97
Ionic Balance	%	-6.9	-4.9	-2.1	-2.3

Miscellaneous Inorganics					
Our Reference	UNITS	33705-1	33705-2	33705-3	33705-4
Your Reference		MW1-210922	MW2-210922	MW3-210922	DUP1-210922
Date Sampled		21/09/2022	21/09/2022	21/09/2022	21/09/2022
Type of sample		Water	Water	Water	Water
Date prepared	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
Date analysed	-	21/09/2022	21/09/2022	21/09/2022	21/09/2022
pH	pH Units	7.4	6.5	6.5	6.5
Electrical Conductivity	µS/cm	430	490	330	490
Total Dissolved Solids (grav)	mg/L	320	330	260	340
Nitrate as N in water	mg/L	0.51	0.13	0.011	0.070
Nitrite as N in water	mg/L	0.13	0.008	<0.005	0.007
Ammonia as N in water	mg/L	0.031	0.045	0.030	0.013
Total Nitrogen in water	mg/L	1.1	1.2	2.0	1.3
NOx as N in water	mg/L	0.63	0.14	0.011	0.077
TKN in water	mg/L	0.5	1.1	2.0	1.2

Method ID	Methodology Summary
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-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate/Nitrite/NOx - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrate/Nitrite/NOx - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen.
Inorg-057	Ammonia - determined colourimetrically. Water samples are filtered on receipt prior to analysis. Soils and OHS media are analysed following a water extraction. Alternatively, Ammonia can be extracted from soil using 1M KCl.
Inorg-062	TKN - determined colourimetrically. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA 22nd ED, 4110-B. Water samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
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-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-023	Water samples are analysed directly 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. 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: VHC's in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
Date analysed	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VHC's in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-023	93	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
Date analysed	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	102	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Surrogate Dibromofluoromethane	%		Org-023	106	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-BFB	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: TRH Water(C10-C40) NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
Date analysed	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	128	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	128	[NT]
Surrogate o-Terphenyl	%		Org-020	78	[NT]	[NT]	[NT]	[NT]	73	[NT]

QUALITY CONTROL: OCP in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
Date analysed	-			26/09/2022	[NT]	[NT]	[NT]	[NT]	26/09/2022	[NT]
alpha-BHC	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
HCB	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
gamma-BHC	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	90	[NT]
delta-BHC	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
gamma-Chlordane	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
alpha-Chlordane	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	108	[NT]
Dieldrin	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Endrin	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan II	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	102	[NT]
Endrin Aldehyde	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Methoxychlor	µg/L	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	64	[NT]	[NT]	[NT]	[NT]	68	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33705-2
Date prepared	-			27/09/2022	1	27/09/2022	27/09/2022		27/09/2022	27/09/2022
Date analysed	-			27/09/2022	1	27/09/2022	27/09/2022		27/09/2022	27/09/2022
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	<1	0	102	83
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	1	<0.1	<0.1	0	106	85
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	7	8	13	106	84
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	<1	0	105	82
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	<1	0	103	87
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	1	<0.05	<0.05	0	108	123
Molybdenum-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	3	4	29	97	80
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	5	5	0	105	82
Tin-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	2	2	0	102	80
Selenium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	<1	0	101	77
Silver-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	<1	0	106	87
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	27	28	4	103	83

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33705-2
Date prepared	-			30/09/2022	1	30/09/2022	30/09/2022		30/09/2022	30/09/2022
Date analysed	-			30/09/2022	1	30/09/2022	30/09/2022		30/09/2022	30/09/2022
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	1	16	16	0	102	76
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	1	1.5	1.5	0	107	95
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	1	39	40	3	104	#
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	1	14	14	0	101	76
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	130	130	0	96	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	<5	0	[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	130	130	0	96	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	18	[NT]		97	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	47	[NT]		96	[NT]
Hardness	mgCaCO 3 /L	3		[NT]	1	98	99	1	[NT]	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	-6.9	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	33705-2
Date prepared	-			21/09/2022	1	21/09/2022	21/09/2022		21/09/2022	21/09/2022
Date analysed	-			21/09/2022	1	21/09/2022	21/09/2022		21/09/2022	21/09/2022
pH	pH Units		Inorg-001	[NT]	1	7.4	7.5	1	99	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	430	430	0	92	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	320	[NT]		97	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.51	[NT]		[NT]	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.13	[NT]		106	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.031	0.026	18	116	119
Total Nitrogen in water	mg/L	0.1	Inorg-055/062	<0.1	1	1.1	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.63	[NT]		105	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	1	0.5	[NT]		94	[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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

METALS: # Percent recovery is not possible to report due to the high concentration of Sodium in the sample/s. However an acceptable recovery was obtained for the LCS.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.00	**Suburb:**	Wollert	**To:**	*Envirolab Services*
Project Manager:	Jim Curtis	**Order Number:**	ME220186 **Sampler:** FS		*22 Research Drive, Croydon VIC 3136*
Email:	jim.curtis@douglaspartners.com.au, felix.smalley@douglaspartners.com.au			**Attn:**	*Pamela Adams*
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day			**Contact:**	*(03) 9763 2500 melbourne@envirolab.com.au*
Prior Storage:	☑ Fridge ☐ Freezer ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes (If YES, then handle, transport and store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water	Container Type: G - glass P - plastic	Analytes: EPA 1828.2 Table 3 Screen	Metals*, TRH, PAH	pH, CEC								Notes/ Preservation/ Additional Requirements
1	TP1-1	0	0.1	24.01.22	S	G	X										
2	TP1-2	0.5	0.6	24.01.22	S	G											
3	TP2-1	0	0.1	24.01.22	S	G		X									
4	TP2-2	0.5	0.6	24.01.22	S	G											
5	TP3-1	0	0.1	24.01.22	S	G	X										
6	TP4-1	0	0.1	24.01.22	S	G		X									
7	TP5-1	0	0.1	24.01.22	S	G		X									
8	TP6-1	0	0.1	24.01.22	S	G											
9	TP7-1	0	0.1	24.01.22	S	G		X									
10	TP8-1	0	0.1	24.01.22	S	G											
11	TP9-1	0	0.1	24.01.22	S	G		X	X								
12	TP9-2	0.5	0.6	24.01.22	S	G											
13	TP10-1	0	0.1	24.01.22	S	G											
14	TP11-1	0	0.1	24.01.22	S	G		X									

ENVIROLAB
Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph. (03) 9763 2500

Job No: 29607
Date Received: 24/1/22
Time Received: 4.45pm
Received by: LO
Temp: Cool/Ambient 22.3°C
Cooling: Ice/Ice-pack
Security: Intact/Broken/None

Metals to analyse:			
Number of samples in container:		**Transported to laboratory by:**	Envirolab courier
Send results to:	Douglas Partners Pty Ltd		
Address:	231 Normanby Road, South Melbourne VIC	**Phone:** (03) 9673 3500	
Relinquished by:	FS	**Date:** 24.1.21	**Signed:**

LAB RECEIPT

Lab Ref. No:	29607
Received by:	LO
Date & Time:	24/1/22 4.45pm
Signed:	LO

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	211616.00	**Suburb:**	Wollert	**To:**	*Envirolab Services*
Project Manager:	Jim Curtis	**Order Number:**		**Dispatch date:**	**24.1.21**	*22 Research Drive, Croydon VIC 3136*

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes											Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water	G - glass P - plastic	EPA 1828.2 Table 3 Screen	Metals*, TRH, PAH	pH, CEC									
15	TP12-1	0	0.1	24.01.22	S	G		X										
16	TP13-1	0	0.1	24.01.22	S	G	X											
17	TP13-2	0.5	0.6	24.01.22	S	G												
18	TP14-1	0	0.1	24.01.22	S	G												

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 29607

Client Details

Client	Douglas Partners
Attention	Jim Curtis
Address	231 Normanby Road, PO Box 5051, South Melbourne, VIC, 3205

Sample Details

Your Reference	**211616.00**
Number of Samples	18 Soil
Date samples received	24/01/2022
Date completed instructions received	24/01/2022

Analysis Details

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

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

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

Report Details

Date results requested by	28/01/2022
Date of Issue	28/01/2022

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

Results Approved By
Chris De Luca, Operations Manager

Authorised By

Pamela Adams, Laboratory Manager

VOCs in soil				
Our Reference		29607-1	29607-5	29607-16
Your Reference	UNITS	TP1-1	TP3-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022
Vinyl Chloride	mg/kg	<0.1	<0.1	<0.1
1,1-Dichloroethene	mg/kg	<0.1	<0.1	<0.1
methylene chloride	mg/kg	<0.2	<0.2	<0.2
trans-1,2-dichloroethene	mg/kg	<0.1	<0.1	<0.1
cis-1,2-dichloroethene	mg/kg	<0.1	<0.1	<0.1
chloroform	mg/kg	<0.1	<0.1	<0.1
1,1,1-trichloroethane	mg/kg	<0.1	<0.1	<0.1
carbon tetrachloride	mg/kg	<0.1	<0.1	<0.1
Benzene	mg/kg	<0.1	<0.1	<0.1
1,2-dichloroethane	mg/kg	<0.1	<0.1	<0.1
trichloroethene	mg/kg	<0.1	<0.1	<0.1
Toluene	mg/kg	<0.1	<0.1	<0.1
1,1,2-trichloroethane	mg/kg	<0.1	<0.1	<0.1
tetrachloroethene	mg/kg	<0.1	<0.1	<0.1
chlorobenzene	mg/kg	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	<0.1	<0.1	<0.1
1,1,1,2-tetrachloroethane	mg/kg	<0.1	<0.1	<0.1
m+p-xylene	mg/kg	<0.2	<0.2	<0.2
o-Xylene	mg/kg	<0.1	<0.1	<0.1
styrene	mg/kg	<0.1	<0.1	<0.1
1,1,2,2-tetrachloroethane	mg/kg	<0.1	<0.1	<0.1
1,4-dichlorobenzene	mg/kg	<0.1	<0.1	<0.1
1,2-dichlorobenzene	mg/kg	<0.1	<0.1	<0.1
1,2,4-trichlorobenzene	mg/kg	<0.1	<0.1	<0.1
hexachlorobutadiene	mg/kg	<0.1	<0.1	<0.1
Total +ve MAHs	mg/kg	<7	<7	<7
Total +ve Chlorinated Hydrocarbons	mg/kg	<0.1	<0.1	<0.1
Total +ve Other Chlorinated Hydrocarbons	mg/kg	<0.1	<0.1	<0.1
Surrogate aaa-Trifluorotoluene	%	106	108	108
Surrogate Dibromofluoromethane	%	103	104	104
Surrogate Toluene-d_8	%	97	97	98
Surrogate 4-Bromofluorobenzene	%	101	98	99

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		29607-1	29607-3	29607-5	29607-6	29607-7
Your Reference	UNITS	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	105	105	107	105	109

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		29607-9	29607-11	29607-14	29607-15	29607-16
Your Reference	UNITS	TP7-1	TP9-1	TP11-1	TP12-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
vTRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
TRH 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 BTEX	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	105	106	108	108

TRH Soil C10-C40 NEPM						
Our Reference		29607-1	29607-3	29607-5	29607-6	29607-7
Your Reference	UNITS	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	95	92	94	94	92

TRH Soil C10-C40 NEPM						
Our Reference		29607-9	29607-11	29607-14	29607-15	29607-16
Your Reference	UNITS	TP7-1	TP9-1	TP11-1	TP12-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
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
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
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	%	93	94	92	92	92

PAHs in Soil						
Our Reference		29607-1	29607-3	29607-5	29607-6	29607-7
Your Reference	UNITS	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
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-d_{14}	%	110	106	106	102	102

PAHs in Soil						
Our Reference		29607-9	29607-11	29607-14	29607-15	29607-16
Your Reference	UNITS	TP7-1	TP9-1	TP11-1	TP12-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
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-d_{14}	%	106	102	106	102	104

Speciated Phenols in Soil				
Our Reference		29607-1	29607-5	29607-16
Your Reference	UNITS	TP1-1	TP3-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022
Phenol	mg/kg	<0.2	<0.2	<0.2
2-Chlorophenol	mg/kg	<0.2	<0.2	<0.2
2-Methylphenol	mg/kg	<0.2	<0.2	<0.2
3/4-Methylphenol	mg/kg	<0.4	<0.4	<0.4
2-Nitrophenol	mg/kg	<0.2	<0.2	<0.2
2,4-Dimethylphenol	mg/kg	<0.2	<0.2	<0.2
2,4-Dichlorophenol	mg/kg	<0.05	<0.05	<0.05
2,6-Dichlorophenol	mg/kg	<0.05	<0.05	<0.05
2,4,5-Trichlorophenol	mg/kg	<0.05	<0.05	<0.05
2,4,6-Trichlorophenol	mg/kg	<0.05	<0.05	<0.05
2,4-Dinitrophenol	mg/kg	<4	<4	<4
4-Nitrophenol	mg/kg	<4	<4	<4
2,3,4,6-Tetrachlorophenol	mg/kg	<0.1	<0.1	<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg	<2	<2	<2
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1
4-Chloro-3-Methylphenol	mg/kg	<0.2	<0.2	<0.2
2,3,4,5-Tetrachlorophenol	mg/kg	<0.1	<0.1	<0.1
2,3,5,6-Tetrachlorophenol	mg/kg	<0.1	<0.1	<0.1
2-Cyclohexyl-4,6-Dinitrophenol	mg/kg	<20	<20	<20
Dinoseb	mg/kg	<5	<5	<5
Total +ve Phenols Halogenated	mg/kg	<1	<1	<1
Total +ve Phenols non-Halogenated	mg/kg	<60	<60	<60
Surrogate Phenol-d_6	%	106	102	100
Surrogate 2-fluorophenol	%	94	90	88

Organochlorine Pesticides in soil				
Our Reference		29607-1	29607-5	29607-16
Your Reference	UNITS	TP1-1	TP3-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve Organochlorine Pesticides	mg/kg	<0.1	<0.1	<0.1
Total +ve report other OC	mg/kg	<0.1	<0.1	<0.1
Tot +ve report Chlordane	mg/kg	<0.1	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	100	96	94

PCBs in Soil				
Our Reference		29607-1	29607-5	29607-16
Your Reference	UNITS	TP1-1	TP3-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil
Date extracted	-	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	25/01/2022	25/01/2022	25/01/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate 2-fluorobiphenyl	%	110	106	108

Metals in soil						
Our Reference		29607-1	29607-3	29607-5	29607-6	29607-7
Your Reference	UNITS	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	28/01/2022	28/01/2022	28/01/2022	28/01/2022	28/01/2022
Date analysed	-	28/01/2022	28/01/2022	28/01/2022	28/01/2022	28/01/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	40	21	35	55	80
Copper	mg/kg	17	9	10	13	11
Lead	mg/kg	10	11	8	8	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	39	10	11	31	17
Tin	mg/kg	<1	<1	<1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	25	8	9	15	10

Metals in soil						
Our Reference		29607-9	29607-11	29607-14	29607-15	29607-16
Your Reference	UNITS	TP7-1	TP9-1	TP11-1	TP12-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	28/01/2022	28/01/2022	28/01/2022	28/01/2022	28/01/2022
Date analysed	-	28/01/2022	28/01/2022	28/01/2022	28/01/2022	28/01/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	55	26	30	26	34
Copper	mg/kg	13	6	8	6	11
Lead	mg/kg	9	8	7	8	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<1	<1	<1	<1	<1
Nickel	mg/kg	19	10	15	9	22
Tin	mg/kg	<1	<1	<1	<1	<1
Selenium	mg/kg	<2	<2	<2	<2	<2
Silver	mg/kg	<1	<1	<1	<1	<1
Zinc	mg/kg	16	7	10	9	14

Miscellaneous Inorg - soil					
Our Reference		29607-1	29607-5	29607-11	29607-16
Your Reference	UNITS	TP1-1	TP3-1	TP9-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	27/01/2022	27/01/2022	27/01/2022	27/01/2022
Date analysed	-	27/01/2022	27/01/2022	27/01/2022	27/01/2022
Total Cyanide	mg/kg	<0.5	<0.5	[NA]	<0.5
Hexavalent Chromium, Cr^{6+}	mg/kg	<1	<1	[NA]	<1
Total Fluoride	mg/kg	280	130	[NA]	280
pH 1:5 soil:water	pH Units	8.2	6.5	6.5	8.2

Moisture						
Our Reference		29607-1	29607-3	29607-5	29607-6	29607-7
Your Reference	UNITS	TP1-1	TP2-1	TP3-1	TP4-1	TP5-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	27/01/2022	27/01/2022	27/01/2022	27/01/2022	27/01/2022
Moisture	%	16	5.2	13	19	11

Moisture						
Our Reference		29607-9	29607-11	29607-14	29607-15	29607-16
Your Reference	UNITS	TP7-1	TP9-1	TP11-1	TP12-1	TP13-1
Depth		0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		24/01/2022	24/01/2022	24/01/2022	24/01/2022	24/01/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/01/2022	25/01/2022	25/01/2022	25/01/2022	25/01/2022
Date analysed	-	27/01/2022	27/01/2022	27/01/2022	27/01/2022	27/01/2022
Moisture	%	15	14	13	14	11

Cation exchange capacity		
Our Reference		29607-11
Your Reference	UNITS	TP9-1
Depth		0-0.1
Date Sampled		24/01/2022
Type of sample		Soil
Date extracted	-	28/01/2022
Date analysed	-	28/01/2022
Exchangeable Ca	meq/100g	6.7
Exchangeable K	meq/100g	0.3
Exchangeable Mg	meq/100g	13
Exchangeable Na	meq/100g	1.9
Cation Exchange Capacity	meq/100g	22

Method ID	Methodology Summary
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-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Inorg-014	Cyanide - free, total, weak acid dissociable by segmented flow analyser (in line dialysis with colourimetric finish). Solids/Filters and sorbents are extracted in a caustic media prior to analysis. Impingers are pH adjusted as required prior to analysis. Cyanides amenable to Chlorination - samples are analysed untreated and treated with hypochlorite to assess the potential for chlorination of cyanide forms. Based on APHA latest edition, 4500-CN_G,H. Please note:- i) The amenable to Chlorination test is only carried out for solids where the Total Cyanide result is >50mg/kg. The Category D/industrial waste upper limit for Total Concentrations of Cyanide (amenable) is 300mg/kg (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (250mg/kg) is to accommodate analytical uncertainty. ii) The amenable to Chlorination test is only carried out for leachates where the Total Cyanide result is >1mg/L. The Category D/industrial waste upper limit for Leachable Concentrations of Cyanide (amenable) is 1.75mg/L (Table 2, VIC EPA 1828.2 March 2021), the lower limit used (1mg/L) is to accommodate analytical uncertainty
Inorg-024	Hexavalent Chromium (Cr6+) - determined colourimetrically by discrete analyser. Water samples are filtered on receipt prior to analysis.
Inorg-026/53	Fluoride by caustic fusion and determined by ion selective electrode (ISE) analysis.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	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. 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).

Method ID	Methodology Summary
Org-021/022	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. 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	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs 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	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, the Total +ve Cresols or Phenols PQL is reflective of the lowest individual PQL and is therefore" Total +ve Cresols or Phenols" is simply a sum of the positive individual Cresols or Phenols.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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. 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: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-1
Date extracted	-			25/01/2022	5	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	5	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Vinyl Chloride	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,1-Dichloroethene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
methylene chloride	mg/kg	0.2	Org-023	<0.2	5	<0.2	<0.2	0	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
cis-1,2-dichloroethene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
chloroform	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	105	107
1,1,1-trichloroethane	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	98	100
carbon tetrachloride	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Benzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,2-dichloroethane	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	106	106
trichloroethene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	99	109
Toluene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
tetrachloroethene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	96	98
chlorobenzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Ethylbenzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,1,1,2-tetrachloroethane	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
m+p-xylene	mg/kg	0.2	Org-023	<0.2	5	<0.2	<0.2	0	[NT]	[NT]
o-Xylene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
styrene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
hexachlorobutadiene	mg/kg	0.1	Org-023	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	109	5	108	108	0	108	103
Surrogate Dibromofluoromethane	%		Org-023	104	5	104	104	0	105	105
Surrogate Toluene-d_8	%		Org-023	97	5	97	97	0	98	96
Surrogate 4-Bromofluorobenzene	%		Org-023	99	5	98	98	0	99	101

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-3
Date extracted	-			25/01/2022	5	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	5	25/01/2022	25/01/2022		25/01/2022	25/01/2022
vTRH C_6 - C_9	mg/kg	25	Org-023	<25	5	<25	<25	0	97	101
vTRH C_6 - C_{10}	mg/kg	25	Org-023	<25	5	<25	<25	0	97	101
Benzene	mg/kg	0.2	Org-023	<0.2	5	<0.2	<0.2	0	91	94
Toluene	mg/kg	0.5	Org-023	<0.5	5	<0.5	<0.5	0	98	101
Ethylbenzene	mg/kg	1	Org-023	<1	5	<1	<1	0	97	101
m+p-xylene	mg/kg	2	Org-023	<2	5	<2	<2	0	100	104
o-Xylene	mg/kg	1	Org-023	<1	5	<1	<1	0	97	101
Naphthalene	mg/kg	1	Org-023	<1	5	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	109	5	107	108	1	108	104

QUALITY CONTROL: TRH Soil C10-C40 NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-3
Date extracted	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	92	103
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	94	86
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	107	61
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	92	103
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	94	86
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	107	61
Surrogate o-Terphenyl	%		Org-020	91	1	95	94	1	99	98

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-5
Date extracted	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Naphthalene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	100	90
Acenaphthylene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	100	92
Fluorene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	108	92
Phenanthrene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	102	90
Anthracene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	100	84
Pyrene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	102	90
Benzo(a)anthracene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	94	85
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	<0.05	1	<0.05	<0.05	0	84	87
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	106	1	110	110	0	112	108

QUALITY CONTROL: Speciated Phenols in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-5
Date extracted	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Phenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	96	85
2-Chlorophenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	98	92
2-Methylphenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	100	94
3/4-Methylphenol	mg/kg	0.4	Org-022	<0.4	1	<0.4	<0.4	0	[NT]	[NT]
2-Nitrophenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
2,4-Dimethylphenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
2,4-Dichlorophenol	mg/kg	0.05	Org-022	<0.05	1	<0.05	<0.05	0	[NT]	[NT]
2,6-Dichlorophenol	mg/kg	0.05	Org-022	<0.05	1	<0.05	<0.05	0	96	93
2,4,5-Trichlorophenol	mg/kg	0.05	Org-022	<0.05	1	<0.05	<0.05	0	[NT]	[NT]
2,4,6-Trichlorophenol	mg/kg	0.05	Org-022	<0.05	1	<0.05	<0.05	0	[NT]	[NT]
2,4-Dinitrophenol	mg/kg	4	Org-022	<4	1	<4	<4	0	[NT]	[NT]
4-Nitrophenol	mg/kg	4	Org-022	<4	1	<4	<4	0	[NT]	[NT]
2,3,4,6-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
2-Methyl-4,6-Dinitrophenol	mg/kg	2	Org-022	<2	1	<2	<2	0	[NT]	[NT]
Pentachlorophenol	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	82	92
4-Chloro-3-Methylphenol	mg/kg	0.2	Org-022	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
2,3,4,5-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
2,3,5,6-Tetrachlorophenol	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
2-Cyclohexyl-4,6-Dinitrophenol	mg/kg	20	Org-022	<20	1	<20	<20	0	[NT]	[NT]
Dinoseb	mg/kg	5	Org-022	<5	1	<5	<5	0	[NT]	[NT]
Surrogate Phenol-d_6	%		Org-022	104	1	106	100	6	110	108
Surrogate 2-fluorophenol	%		Org-022	94	1	94	90	4	98	92

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-5
Date extracted	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
alpha-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	94	85
Hexachlorobenzene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	88	77
gamma-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	86	80
delta-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	86	80
Heptachlor Epoxide	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	94	87
gamma-Chlordane	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	88	84
alpha-chlordane	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	94	87
Dieldrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	90	84
Endrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	108	103
Endrin Aldehyde	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	98	93
Methoxychlor	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	96	1	100	90	11	100	96

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-5
Date extracted	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Date analysed	-			25/01/2022	1	25/01/2022	25/01/2022		25/01/2022	25/01/2022
Aroclor 1016	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	91	85
Aroclor 1260	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-fluorobiphenyl	%		Org-022	110	1	110	108	2	116	110

QUALITY CONTROL: Metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-6
Date digested	-			28/01/2022	7	28/01/2022	28/01/2022		28/01/2022	28/01/2022
Date analysed	-			28/01/2022	7	28/01/2022	28/01/2022		28/01/2022	28/01/2022
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	7	<4	<4	0	97	82
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	7	<0.4	<0.4	0	104	94
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	7	80	82	2	111	122
Copper	mg/kg	1	Metals-020 ICP-AES	<1	7	11	11	0	99	104
Lead	mg/kg	1	Metals-020 ICP-AES	<1	7	9	10	11	106	87
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	7	<0.1	<0.1	0	120	111
Molybdenum	mg/kg	1	Metals-020 ICP-AES	<1	7	<1	<1	0	101	74
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	7	17	18	6	103	116
Tin	mg/kg	1	Metals-020 ICP-AES	<1	7	<1	<1	0	98	87
Selenium	mg/kg	2	Metals-020 ICP-AES	<2	7	<2	<2	0	90	76
Silver	mg/kg	1	Metals-020 ICP-AES	<1	7	<1	<1	0	107	112
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	7	10	11	10	101	99

QUALITY CONTROL: Miscellaneous Inorg - soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	29607-16
Date prepared	-			27/01/2022	16	27/01/2022	27/01/2022		27/01/2022	27/01/2022
Date analysed	-			27/01/2022	16	27/01/2022	27/01/2022		27/01/2022	27/01/2022
Total Cyanide	mg/kg	0.5	Inorg-014	<0.5	16	<0.5	<0.5	0	84	102
Hexavalent Chromium, Cr^{6+}	mg/kg	1	Inorg-024	<1	16	<1	<1	0	100	[NT]
Total Fluoride	mg/kg	50	Inorg-026/53	<50	16	280	[NT]		82	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	16	8.2	8.2	0	98	[NT]

QUALITY CONTROL: Cation exchange capacity						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	102	[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.

Appendix G

Soil Contamination Assessment Criteria

APPENDIX G

1. Soil Contamination Assessment Criteria

The *Environment Reference Standard* (Government of Victoria 2021) outlines land use categories and associated environmental values which must be protected for each category. Table G1 summarises the environmental values which are relevant to each land use category.

Table G1: Environmental Values and Land Use Categories

Environmental Values		Land Use						
		Parks & Reserves	Agricultural	Sensitive Use		Recreation/ Open Space	Commercial	Industrial
				High Density	Other			
Land Dependant ecosystems and species	Natural ecosystems	✓						
	Modified Ecosystems	✓	✓		✓	✓		
	Highly Modified Ecosystems		✓	✓	✓	✓	✓	✓
Human Health		✓	✓	✓	✓	✓	✓	✓
Buildings and Structures		✓	✓	✓	✓	✓	✓	✓
Aesthetics		✓		✓	✓	✓	✓	
Production of Food, Flora and Fibre		✓	✓		✓			

Under The Proposal, the Study Area will be occupied by a waste recovery centre. As such, it is considered that the relevant environmental values are those applicable to an industrial land use as highlighted in Table G1. In accordance with the Environmental Reference Standard, these comprise:

(i) Maintenance of highly modified ecosystems

(ii) Human health

(iii) Buildings and structures.

Any exceedances of these investigation thresholds will trigger further consideration of environmental risk and the consideration of remediation or management.

A summary of relevant adopted soil assessment criteria (SAC) and their source references is provided in Table G2 and discussed in more detail in sections 1.1.1 to 1.1.3.

Table G2: Soil Assessment Criteria

Relevant Criteria	Criteria Reference
Maintenance of ecosystems and Human health	• National Environment Protection Council (NEPC 2013) National Environmental Protection (Assessment of Site Contamination) Measure 1999 ([the *'NEPM'*] as amended 2013) • Canadian Council of Ministers of the Environment (2007) Soil Quality Guidelines for the Protection of the Environment and Human Health.
Waste Categorisation	• EPAV Publication 1828.2 March 2021, *Waste Disposal Categories – Characteristics and Thresholds* (EPA Victoria, 2021).

1.1.1 Ecological SAC

For the protection of environmental receptors within the Study Area, contaminant concentrations were initially compared against Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) which are applicable for assessing risk to terrestrial ecosystems. EILs have been developed for selected metal and organic contaminants and ESLs for selected petroleum hydrocarbon compounds and fractions. Both EILs and ESLs apply to the top 2 m of the soil profile, which essentially corresponds to the root zone and habitation zone of most species.

Generic EILs and ESLs for different land use settings are available in the NEPM (2013) for selected contaminants. For this investigation EILs and ESLs for arsenic, lead, DDT, naphthalene, benzene, toluene, ethyl benzene, xylene and benzo(a)pyrene, applicable to clay soils and a high-density residential land use, have been adopted directly from Tables 1B(4), 1B(5) and 1B(6) of Schedule B1 of the NEPM. Further site specific EILs were derived as follows:

- EILs for arsenic, DDT, naphthalene, lead, copper, nickel, chromium (III), and zinc were calculated using DP's in-house Enviroreporter software. The state of Victoria and a low traffic volume were adopted, as well as a clay content of 10% (based on fieldwork findings). The mean average of six pH results (7.81 pH units) and one Cation Exchange Capacity (CEC) result (22 cmolc/kg dwt) derived in the original investigation as well as the current investigation were used to generate the EILs. The criteria for aged contamination was adopted; and
- Where site-specific or generic EILs from the NEPM are not available, selected criteria from the Canadian Council of Ministers of the Environment (2007) Soil Quality Guidelines for the Protection of the Environment and Human Health, Dutch 2009 target values and USEPA Eco SSL (June 2017) have been adopted.

The adopted EILs are presented in Table E1 of Appendix E.

1.1.2 Human Health SAC

For the protection of human health, contaminant concentrations in soil are compared against human Health Investigation Levels (HILs). The HILs are scientifically-based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic land use scenarios as summarised in Table G3.

Table G3: Summary of Human Health Investigation Levels

Land Use	Health Investigation Level
Low Density Residential	HIL A
High Density Residential	HIL B
Recreational / Public Open Space	HIL C
Commercial / Industrial	HIL D

Criteria for all the HIL land uses have been compared to soil results from this investigation, given the nature of The Proposal, HIL D is considered applicable under the proposed final conditions of the Study Area.

The NEPM also provides Health Screening Levels (HSLs) for the evaluation of vapour intrusion risks for hydrocarbon-contaminated soils. These criteria have been taken directly from Table 1A (5) of the NEPM Schedule B1. Based on the soil conditions encountered at the site during the assessment phase of the investigation, criteria applicable to *Clay* (fine textured soil) have been adopted. Details of site soil conditions are provided in Section 9.2 of this report.

The NEPM provides management limits for petroleum hydrocarbons, which are designed to address the risk of the formation of light non-aqueous phase liquids (LNAPL), fire and explosive hazards, and effects on buried infrastructure. When management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed. Management limits have been taken directly from Table 1B (7) of the NEPM Schedule B1.

The adopted HILs, HSLs are presented in Table E1 and E2 in Appendix E.

1.1.3 Soil Hazard Categorisation

To provide an indicative soil hazard categorisation for soils to be removed from site (if required), DP compared the soil laboratory results to the upper limits set out in EPA Publication 1828.2 March 2021, *Waste Disposal Categories – Characteristics and Thresholds* (EPA Victoria, 2021), which is the current industry standard used to assess soil prior to off-site disposal. Under the guidelines, soil can be classified into one of five categories based on its relative hazard for off-site disposal. From least to most contaminated, the categories are:

- Fill Material
- Category D contaminated soil
- Category C contaminated soil
- Category B contaminated soil
- Category A contaminated soil.

The soil hazard categorisation criteria are presented in Table E3 of Appendix E and are described below.

i) Fill Material

This classification consists of soil (being clay, silt, and sand), gravel and rock, all being naturally-occurring materials. Contaminant levels must be below those specified in Table 2 of EPA Publication 1828.2, otherwise the material must be classified as a prescribed waste (Contaminated Soil).

Soil may contain naturally elevated levels of metals, such as arsenic, or other constituents. Where it can be demonstrated that the constituents of concern are naturally elevated, EPA does not consider these soils to be 'contaminated'. However, the placement of Fill Material with naturally elevated constituents must still be managed to ensure that it will not adversely affect human health and the environment.

EPA has no restriction on where Fill Material may be disposed although councils may have other requirements. The deposition of Fill Material must not result in any off-site impact on surface or groundwater. The industry often refers to Fill Material as "clean fill". Fill Material may contain contaminants above background levels and may not be suitable for all uses.

ii) Category D Contaminated Soil

Soils that contain contaminant concentrations greater than the upper limits for Fill Material but lower than the upper limits for Category D soils (as defined in Table 2 of EPA Publication 1828.2), are categorised as Category D contaminated soils. These soils represent the least hazardous soils. Although volumes of less than 1,000 m^3 may be reused within a project site, if they are disposed of from site, must be disposed of to a licensed landfill under EPA Waste transport certification.

iii) Category C Contaminated Soil

Where soil has contaminant concentrations above the Category D upper limits published in Table 2 of EPA Publication 1828.2, but less than the Category C upper limits, it is classified as Category C contaminated soil. Category C contaminated soil can only be disposed off-site to select landfills licensed by the EPA to accept Category C contaminated soil. Vehicles transporting Category C contaminated soil must have a current EPA Waste Transport Permit and an EPA Waste Transport Certificate must be completed for soil tracking purposes. All loads should be covered to prevent wind-blown loss. Leaks or spills of contaminated material to the environment must also be prevented.

iv) Category B Contaminated Soil

Soil with any contaminant concentration or leachable concentration above the Category C upper limits but less than Category B upper limits in Table 2 of EPA Publication 1828.2, is classified as Category B

contaminated soil. Category B contaminated soil can only be disposed off-site to landfills licensed by the EPA to accept Category B contaminated soil. There is currently only one landfill facility in Victoria licensed to accept Category B contaminated soil, Suez at Lyndhurst. Vehicles transporting Category B contaminated soil must have a current EPA Waste Transport Permit and an EPA Waste Transport Certificate must be completed for soil tracking purposes. All loads should be covered to prevent wind-blown loss. Leaks or spills of contaminated material must be prevented.

v) Category A Contaminated Soil

Soil with any contaminant concentration or leachable concentration above the Category B upper limits published in Table 2 of EPA Publication 1828.2 is classified as Category A contaminated soil. Category A contaminated soil cannot be disposed off-site to landfill. Category A contaminated soil requires treatment to reduce or control the hazard before meeting acceptance criteria for disposal at an EPA licensed facility.

2. Groundwater Assessment Criteria

The *Environment Reference Standard* (Government of Victoria 2021) outlines the environmental values of groundwater that are to be protected, based on the concentrations of total dissolved solids (TDS) present.

The significance of contaminant impact upon groundwater is assessed in conjunction with the applicable environmental values. Table G4, adapted from the *Environment Reference Standard* 2021, outlines the protected environmental values for the various groundwater segments.

TDS concentrations recorded during the current investigation works at the site (see Section 11.2) varied between 260 mg/L and 330 mg/L. Based on the site measured TDS values, groundwater at the site would be classified as Segment A1. Table G4 presents the environmental values associated with Segment A1 as highlighted.

Table G4: Protected Environmental Values of Groundwater

Environmental Value	Segment Based on TDS (mg/L) Range						
	A1	A2	B	C	D	E	F
	0-600	601-1,200	1,201-3,100	3,101-5,400	5,401-7,100	7,101-10,000	>10,001
Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	✓
Potable water supply (desirable)	✓						
Potable water supply (acceptable)		✓					
Potable mineral water supply	✓	✓	✓	✓			
Agriculture and irrigation (irrigation)	✓	✓	✓				
Agriculture and irrigation (stock watering)	✓	✓	✓	✓	✓	✓	
Industrial and commercial	✓	✓	✓	✓	✓		
Water-based recreation (primary contact recreation)	✓	✓	✓	✓	✓	✓	✓
Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
Cultural and spiritual values	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Geothermal properties	✓	✓	✓	✓	✓	✓	✓

Based on the identified beneficial uses shown in Table G4, the related assessment criteria adopted by DP are shown in Table G5. It should be noted that:

- Measured groundwater temperatures were less than 30ºC, which precludes the Geothermal properties beneficial use
- *Traditional Owner Cultural Values* and Cultural and *Cultural and Spiritual Values* beneficial uses are considered to be associated activities and consistent with the *Water-based recreation* beneficial use. As such these beneficial uses are not listed in Table G5 and will be assessed under the *Water–based recreation* criteria
- Groundwater at the site is not effervescent and the site is not within a designated mineral springs area. As such the *Potable Mineral Water* Beneficial use is not considered to be relevant.

Table G5: Adopted Groundwater Assessment Criteria

Environmental Values	Adopted Groundwater Assessment Criteria
Water dependent ecosystems and species (WDE)	ANZECC (2000) Fresh Water Ecosystems Criteria, 95% Level of Protection or 99% for bio-accumulated contaminants (or default criteria where applicable).
Potable water supply (PWS)	NHMRC (2011, as updated 2018) Australian Drinking Water Guidelines 6, version 3.5.
Agriculture and irrigation (AI)	ANZECC (2000) Stock Water.
	ANZECC (2000) Irrigation Water.
Industrial Water Use (IW)	Industrial water use criteria vary widely depending on the type of industry. It was assumed that comparison to the criteria for more sensitive beneficial uses would provide an indication of whether this beneficial use would be affected.
Water-based recreation (WBR)	NHMRC (2008) Guidelines for managing risks in recreational water.
Buildings and Structures	Australian Standard 2159-2009 'Piling - Design and Installation'.

To assess the risk to human health via the migration of vapours, Health Screening Levels (HSLs), applicable to groundwater at depths of 2 m to < 4 m in sand aquifers within an industrial land use setting have been applied, as referenced in Table 1A (4) of the NEPM. It should be noted that although groundwater at the site is within a fractured rock unit (basalt) which is overlain by high plasticity clay, a sand aquifer has been adopted to represent the most conservative vapour intrusion scenario.

Assessment criteria adopted for specific contaminants are provided in Table E4, Appendix E.

Douglas Partners Pty Ltd

Appendix H

Quality Assurance and Quality Control

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Geotechnics | Environment | Groundwater

QUALITY ASSURANCE AND QUALITY CONTROL

Soil Contamination Investigation

Proposed Resource Recovery Centre

510 Summerhill Road, Wollert

H1. Data Quality Objectives

The scope of works was devised broadly in accordance with the seven step data quality objective process, as defined in in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013). The DQO process is outlined as follows:

i) State the Problem - The purpose of this step is to clearly define the problem that requires assessment and additional data so that the focus of the study will be clear and unambiguous;

ii) Identify the Decision - The purpose of this step is to define the decision that will be resolved using information and data accumulated to address the problem;

iii) Identify Inputs to the Decision - The purpose of this step is to identify the informational inputs that will be required to resolve the decision, and to determine which inputs require environmental measurements;

iv) Define the Boundary of the Assessment - The purpose of this step is to specify the spatial and temporal circumstances that are covered by the decision;

v) Develop a Decision Rule - The purpose of this step is to integrate the outputs from previous steps into a single statement that describes the logical basis for arriving at the appropriate proposed action;

vi) Specify Acceptable Limits on Decision Errors - The purpose of this step is to specify acceptable limits on decision errors, which are used to establish appropriate performance objectives for limiting uncertainty in the data; and

vii) Optimise the Design for Obtaining Data - The purpose of this step is to identify the most resource-effective sampling and analysis design for producing data that are expected to satisfy the DQOs.

A summary of implementation of the DQO process is provided in Table G1.

Table H1: Implementation of DQO Process

DQO	Implementation
1. State the Problem	It is understood that the site will be redeveloped for residential use. The aim of the study is to assess the spatial distribution of a range of potential soil and groundwater contaminants.
2. Identify the Decision	The decision was based on whether detected levels of contamination exceed relevant published investigation levels and constitute a risk to the protected beneficial uses of land and groundwater.
3. Identify Inputs to the Decision	Inputs to the decision included the following: - Site characterisation using site history information. - Visual and aesthetic assessment of site soils. - Soil analytical data. - Groundwater analytical data. - Laboratory reports including QC procedures.
4. Define the Boundary of the Assessment	The boundary of the assessment was that described in Section 3 of the main body of this report.
5. Develop a Decision Rule	Systematic and targeted soil sampling locations that contain aesthetically unsuitable materials or concentrations of contaminants above their respective investigation levels were considered to be impacted.
6. Specify Acceptable Limits on Decision Errors	Error can be introduced from sampling/sample design strategy and during the laboratory analysis. Data precision and accuracy are assessed as part of the field and laboratory QA/QC implemented. Acceptable (tolerable) limits on decision errors are discussed below.
7. Optimise the Design for Obtaining Data	Strategic sampling and targeted analysis was adopted for the current assessment in light of site history investigation.

H2. Quality Assurance/Quality Control Objectives

QA/QC objectives were developed for the environmental soil and groundwater sampling undertaken to ensure the integrity and reproducibility of the tests, and to provide a check on the potential for cross-contamination during the sampling process.

The procedures undertaken to achieve the QA/QC objectives included deployment of trained personnel familiar with soil and groundwater sampling techniques. Laboratory testing for soil and groundwater was undertaken by ALS Water Resources Group and Envirolab.

Quality Assurance (QA) was maintained by:

- Using qualified and experienced environmental scientists and engineers to undertake the field supervision and sampling;
- Following the appropriate DP operating procedures for groundwater sampling, field testing and decontamination as presented in Appendix F; and
- Using NATA registered laboratories for sample testing that utilise standard analytical laboratory methods of the US EPA, the APHA and Victorian EPA.

Table H2: Field Procedures

Abbreviation	Procedure Name
FPM LOG	Logging
FPM DECONT	Decontamination of Personnel and Equipment
FPM ENVID	Sample Identification, Handling, Transport and Storage of Contaminated Samples
FPM ENVSAMP	Sampling of Contaminated Soils and Sludges

(from Douglas Partners Field Procedures Manual)

H3. Field Quality Assurance/Quality Control

DP collected duplicate soil and groundwater samples in the field and sent both samples to the primary laboratory for analysis without any indication of their duplication. Samples were analysed for the same parameters. This procedure is known as an Intra-laboratory (or blind) duplicate sampling.

DP also split a soil samples into two in the field and sent one sample to the primary laboratory and one sample to the secondary laboratory for analysis. Samples were analysed for the same parameters. This procedure is known as Inter-laboratory (or check) duplicate sampling.

A measure of laboratory precision was obtained by calculating the relative percent difference (RPD) between duplicate pairs, as shown in equation (1) below. The RPD has a value between 0% and 200%, and DP generally adopts a criterion of between 0% and 50% as acceptable, depending on the contaminant. If the RPD is above 50% but the results of analysis are less than 10 times the laboratory reporting limit, they are also considered acceptable.

$$\%RPD = \frac{|C_{original} - C_{duplicate}|}{Average(C_{original}, C_{duplicate})} \times 100 \qquad (1)$$

H3.1 Intra-Laboratory Duplicate Testing

The results of Intra-laboratory duplicate testing for soil and groundwater are presented in Tables E1 and E4, Appendix C, respectively, and are summarised below.

Soil

One soil sample was tested as an Intra-laboratory duplicate. All of the 26 RPD results were below the 50% criterion, indicating that the laboratory results can be relied upon.

Groundwater

A single groundwater sample was tested as an intra-laboratory duplicate sample. All 39 RPD values were below the adopted 50% criteria, indicating that the laboratory results can be relied upon.

H3.2 Inter-Laboratory Duplicate Testing

Inter-laboratory duplicate testing was restricted to the analysis of one soil sample. The results are presented in Table E1 in Appendix E.

Exceedances of the adopted RPD criterion were noted for 2 of the 26 RPD results as summarised in Table H3. The low percentage of RPD values (7.5%) outside of the acceptable range, indicate minor variability between the duplicate pairs Based on this it is considered that the laboratory results can be relied upon.

Table H3: Summary of Soil Intra-Laboratory RPD Exceedances

Duplicate Pair	Analyte	Concentrations (mg/kg)	RPD (%)
TP15-0.0-0.05 *DUP2*	Nickel	40 / *67*	**51**
	Zinc	20 / *46*	**79**

H4. Laboratory Quality Assurance / Quality Control

Quality Control (QC) of the laboratory program was achieved by the following means:

- Method blanks - the laboratory ran reagent blanks to confirm the equipment and standards used were uncontaminated;
- Laboratory duplicates - the laboratory split samples internally and conducted tests on separate extracts; and
- Laboratory spikes - samples were spiked by the laboratory with a known concentration of contaminants and subsequently tested for recovery.

Due to limitations with the ALS Scoresby reporting system, laboratory QC results are not provided alongside the report.

H4.1. Method Blanks

All method blanks from the primary laboratory returned results below the laboratory reporting limit and are therefore acceptable.

H4.2. Laboratory Duplicates

Although DP generally adopts a criterion of 50% as acceptable, where differences are >10 times the limit of reporting ELS accepts internal RPDs typically in the range of between 20% and 50% depending on the analyte.

ELS soil laboratory RPDs ranged from 0% to 39% and are thus considered acceptable by DP.

H4.3. Laboratory Spikes

ELS adopts an acceptable range of 70% to 130% for the recovery of inorganics and metals, 50 to 140% for organics, and 10% to 140% for semi-volatile organic compounds, ultra-trace organics and speciated phenols.
Envirolab spike results ranged from 85% to 124% and are thus considered acceptable by DP.

H4.4 Holding Times

All soil and groundwater samples were analysed within specified holing times.

H4.5 QA/QC Conclusions

In summary, the accuracy and precision of the soil, and groundwater testing procedures, as inferred by the QC data, is considered by DP to be of sufficient standard to allow the data reported by the primary and secondary laboratories to be used for interpretation of site contamination conditions.