31 January 2023
Ref: E35451Blet-WC

Williams River Steel
25 Old Punt Road
Tomago NSW 2322

Attention: Mr Chris White
Email: chris.white@wrsteel.com.au

PRELIMINARY WASTE CLASSIFICATION ASSESSMENT
PROPOSED AMG TOYOTA DEVELOPMENT
61 DARLEY STREET, MONA VALE, NSW

1 INTRODUCTION

Williams River Steel ('the client') commissioned JK Environments (JKE) to assign a preliminary waste classification to the in-situ soil located at 61 Darley Street, Mona Vale, NSW. The site location is shown on Figure 1 and sampling for the assessment was confined to the in-situ soil in accessible areas of the site as shown on Figure 2 attached in the appendices.

The purpose of this assessment was to provide a preliminary waste classification for the off-site disposal of waste soil to be excavated during the proposed development. The assessment was undertaken generally in accordance with a JKG proposal (Ref: P56674L) of 24 May 2022 and written acceptance from the client dated 31 August 2022.

A geotechnical investigation was undertaken in conjunction with the preliminary waste classification assessment by JK Geotechnics and the results are presented in the geotechnical report (Ref: 35451Lrpt).

1.1 Assessment Guidelines

The assessment and preparation of this report were undertaken with reference to the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014)[1].

1.2 Proposed Development Details

JKE understand that the proposed development includes the construction of a two-storey commercial building over a single basement level. The proposed new building will occupy the majority of the site area.

[1] NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

The proposed basement abuts the western and southern site boundaries and is set back approximately 1.8m and 0.8m of the north-eastern and south-eastern boundaries, respectively.

Excavation for the proposed development is anticipated to be to a maximum depth of approximately 3m below ground level (BGL) within the high side (western boundary) of the site, with shallower excavations expected towards the eastern portion of the site.

2 SITE INFORMATION

2.1 Site Information and Description

Table 2-1: Site Identification

Site Address:	61 Darley Street, Mona Vale, NSW
Lot & Deposited Plan:	Lot 4 in DP 835792
Current Land Use:	Vehicle dealership carpark
Site Area (m^2):	1,250
Geographical Location (approx.):	Latitude: -33.676382 Longitude: 151.307575

The site is located within a predominantly commercial area of Mona Vale. The site is bound by Darley Street to the north-east and Barrenjoey Road to the south shown on Figure 1 attached.

The regional topography is characterised by a north-east facing hillside. The site is located at the mid-slope of the north-east hillside and slopes to the north-east at approximately 3°-4°.

At the time of the inspection, the site was an asphaltic concrete paved carpark associated with a motor vehicle dealership business (Col Crawford Demonstrator Centre). A concrete paved driveway was located along the north-eastern boundary, fronting Darley Street. A rectangular building and carport of wood and metal construction was located within the western and northern portions of the site respectively. Grassed landscaped areas were located along the north-eastern, southern and parts of the south-western site boundaries. There were no stress or dieback observed from the onsite vegetation.

The site surrounds included: a clothing retailer and embroidery business (Fully Promoted) to the north; Barrenjoey Road to the south; a tyre and motor mechanics (Jax Tyres and Auto) and tile retailer (Amber Tiles) to the west; and Darley Road to the east. Two service stations (7-Eleven and BP) were observed located to the south-east and down-gradient of the site.

2.2 Background/Historical Information

JKE were not provided with any historical reports or background information for the site. On this basis, JKE has undertaken a preliminary review of historical information based on the following:

- The 1983 and 2014 aerial photographs for the site available on the NSW Spatial Services Historical Imagery database[2]; and
- The contaminated land records provided by the NSW EPA[3].

Based on interpretation of the aerial photographs, JKE are of the opinion that the land use at the site appeared to be commercial from at least 1983. Buildings were observed within the site from the 1983 photograph. The site surrounds appeared to be commercial and residential land use and the photographs did not indicate any obvious industrial land uses in the immediate vicinity of the site. There were no records for the site on the NSW EPA contaminated land registers.

Considering the above information, the assessment has considered a broad suite of potential contaminants as outlined in Section 4.5.

2.3 Regional Geology

The geological map of Sydney (1983)[4] indicates the site to be underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

2.4 Acid Sulfate Soil Risk Map

A review of the acid sulfate soils (ASS) risk maps prepared by Department of Land and Water Conservation (1997)[5] indicates that the site is located in an area classed as 'high probability' of ASS occurrence between 1m-3m below the ground surface.

2.5 Pittwater Local Environmental Plan (LEP) 2014

A review of the Pittwater LEP indicates that the site is located within an ASS risk Class 3 area.

As the site is located within an ASS risk Class 3 area, selected soil samples were analysed for ASS characteristics for waste classification purposes.

[2] https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccddda8075238cb

[3] http://www.epa.nsw.gov.au/

[4] Department of Mineral Resources, (1983). *1:100,000 Geological Map of Sydney (Series 9130)*

[5] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130S1, Ed 2)*

3 INVESTIGATION REQUIREMENTS AND ASSESSMENT CRITERIA

3.1 NSW EPA Waste Classification Guidelines

Off-site disposal of fill, contaminated material, stockpiled soil, natural soil, rock excavated as part of the proposed development works is regulated by the Protection of the Environment Operations Act (1997)[6] and associated regulations and guidelines including the Part 1 of the Waste Classification Guidelines.

The waste classification guidelines require an assessment of the following steps:

- Step 1: is the waste special waste?
- Step 2: is the waste liquid waste?
- Step 3: is the waste pre-classified?
- Step 4: does the waste possess hazardous characteristics?
- Step 5: Determining a waste's classification using chemical assessment.

Soils are classed into the following categories based on the chemical contaminant criteria outlined in the guidelines:

Table 3-1: Waste Categories

Category	Description
General Solid Waste (non-putrescible)	• If Specific Contaminant Concentration (SCC) ≤ Contaminant Threshold (CT1) then Toxicity Characteristics Leaching Procedure (TCLP) not needed to classify the soil as general solid waste; • If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as general solid waste
Restricted Solid Waste (non-putrescible)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as restricted solid waste; and • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as restricted solid waste
Hazardous Waste	• If SCC > CT2 then TCLP not needed to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

[6] Protection of Environment Operations Act 1997 (NSW) (POEO Act 1997)

3.2 ASS Action Criteria

The action criteria presented in the *National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual* (2018) are summarised in the following table:

Table 3-2: ASS Action Criteria Based on Soil Texture and Volume of Material Being Disturbed

Type of material		**Net Acidity**			
Texture range* (NCST 2009)	Approximate clay content (%)	1–1000 t materials disturbed		> 1000 t materials disturbed	
		% S-equiv. (oven-dried basis)	mol H^+/t (oven-dried basis)	% S-equiv. (oven-dried basis)	mol H^+/t (oven-dried basis)
Fine - light medium to heavy clays	>40	≥0.10	≥62	≥0.03	≥18
Medium - clayey sand to light clays	5–40	≥0.06	≥36	≥0.03	≥18
Coarse and Peats - sands to loamy sands	<5	≥0.03	≥18	≥0.03	≥18

* If bulk density values are not available for the conversion of cubic meters to tonnes of soil, then default bulk densities, based on the soil texture, may be used.

The action criteria for coarse sands were used for this assessment.

3.3 ASS Field Tests

The soil field tests commonly used for investigations for ASS materials include field pH (pH_F) and field pH peroxide (pH_{FOX}) tests. The pH_F test can help identify Actual ASS. While a pH_F of less than or equal to pH 4 is indicative of the presence of Actual ASS, it is not conclusive of the presence of ASS on its own, as naturally occurring, non ASS soils such as many organic soils (for example peats) and heavily leached soils may also have pH_F less than or equal to pH 4. To identify an Actual ASS other evidence must be presented that indicates the low pH_F has been mainly caused by the oxidation of reduced inorganic sulfur. Such information includes the presence of jarosite in the soil layer/horizon, or the location of other Actual ASS or PASS materials within the sampling location or in the nearby vicinity.

The difference between the pH_F and the pH_{FOX} is helpful in the preliminary identification of PASS. Combined, the pH_F and pH_{FOX} results can be a useful aid with soil sample selection for laboratory analysis.

4 ASSESSMENT AND INVESTIGATION PROCEDURE

4.1 Five Step Assessment of Waste

The five steps assessment of the waste is provided in the following table:

Table 4-1: Five Step Assessment

Step	Assessment
Step 1: is the waste special waste?	No. The potential for the waste to contain special waste (asbestos) is to be considered further during the assessment.
Step 2: is the waste liquid waste?	No.
Step 3: is the waste pre-classified?	No.
Step 4: does the waste possess hazardous characteristics?	No.
Step 5: Determining a waste's classification using chemical assessment.	Required, as documented in the subsequent sections of this report.

4.2 Subsurface Investigation and Soil Sampling Methods

Field work for this assessment was undertaken on 12 October 2022. Soil samples were obtained from three boreholes (BH1 to BH3) drilled for the JK geotechnical investigation. The sampling locations are shown on Figure 2 attached in the appendices. The sampling for the waste classification was limited to approximately 1.7mBGL.

The sample locations were drilled using a track mounted hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler.

Soil samples were collected from the fill and natural profiles encountered during the investigation. Additional fill samples were obtained when relatively deep fill (>0.5m) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. All samples were recorded on the borehole logs attached in the appendices.

Samples for contamination analysis were placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for ASS analysis were obtained in plastic bags and sealed with plastic ties with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date.

4.3 Screening for Volatile Organic Compounds (VOCs)

A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for further analysis for petroleum hydrocarbons. PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases.

The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source. The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

4.4 Decontamination and Sample Preservation

The sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS4482.1-2005[7] and AS4482.2-1999[8] as summarised in the following table:

Table 4-2: Soil Sample Preservation and Storage

Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4°, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals)
Hydrocarbons, pesticides and other organics	As above	Store at <4°, analysis within 14 days
Asbestos	Sealed plastic bag	None

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard Chain of Custody (COC) procedures.

4.5 Laboratory Analysis

Samples were analysed for a range of potential contaminants based on the site information presented in Section 2.2. The site history information was limited, however the limitations were compensated for by analysing the samples for a broad range of contaminants. The analytical schedule is summarised in the following table:

Table 4-3: Analytical Schedule (Primary Samples)

Analyte	N - Fill Samples	N - Natural Soil (and/or rock) Samples
Heavy Metals (arsenic, cadmium, chromium^, copper, lead, mercury, nickel and zinc)	3	3

[7] Standards Australia, (2015). *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*

[8] Standards Australia, (1999). *Guide to the investigation and sampling of potentially contaminated soil, Part 2: Volatile Substances*

Analyte	N - Fill Samples	N - Natural Soil (and/or rock) Samples
Total Recoverable Hydrocarbons (TRHs) and monocyclic aromatic hydrocarbons including benzene, toluene, ethylbenzene and xylene (BTEX);	3	3
Polycyclic Aromatic Hydrocarbons (PAHs)	3	3
Organochlorine pesticides (OCPs)	3	3
Organophosphate pesticides (OPPs)	3	3
Polychlorinated biphenyls (PCBs)	3	3
Asbestos	3	3
Toxicity characteristic leachate procedure (TCLP) heavy metals	3	3
TCLP PAHs	3	3

Notes:

N: Total number (primary samples)

^ Samples for the waste classification assessment were analysed for total chromium not hexavalent chromium. There are no CT and SCC criteria for total chromium, therefore the results have been assessed against the hexavalent chromium criteria.

Samples for ASS analysis were undertaken for ASS field tests (including pH_F and pH_{FOX}) and the chromium reducible sulfur (S_{CR}) acid base accounting analytical methods. All tests/analysis were performed at the laboratory and JKE did not carry out the testing in the field due to WHS constraints.

Samples were analysed by Envirolab Services (NATA Accreditation Number – 2901) using the analytical methods detailed in the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)[9] and relevant Australian Standards. Reference should be made to the laboratory reports (Ref: 307977 and 307977-A) attached in the appendices for further information.

5 RESULTS

5.1 Subsurface Conditions/Description of Waste

A summary of the subsurface soil conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

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

Table 5-1: Summary of Subsurface Conditions

Profile	Description (depth in m below ground level)
Pavement	Asphaltic concrete pavement was encountered in all boreholes (BH1 to BH3 inclusive) and ranged in thickness from approximately 10mm to 150mm thick.
Fill	Fill material was encountered in all boreholes and extended to depths of approximately 0.4mBGL to 0.6mBGL. The fill typically comprised silty clay and silty sandy gravel. The fill contained inclusions of igneous and ironstone gravel, sand and ash. Staining, odours or materials indicative of ASS (i.e. dredged material) were not observed in the fill during sampling.
Natural Soil	Silty clay natural soil was encountered in all boreholes and extended to depths of approximately 1.3mBGL to 2mBGL. The natural soil was typically grey mottled red brown and orange brown and contained inclusions of ironstone gravel and iron indurated bands. Staining or odours were not observed in the natural soil during sampling.
Bedrock	Siltstone and sandstone bedrock were encountered in all boreholes. The siltstone bedrock extended to depths of approximately 1.7mBGL to 3.3mBGL, underlain by sandstone bedrock. The sandstone bedrock extended to the termination of the boreholes at a maximum depth of approximately 10mBGL. The bedrock was typically grey and orange brown. Staining or odours were not observed in the bedrock during sampling.
Groundwater	Seepage was not encountered during auger drilling of the boreholes. Reference should be made to the JKG geotechnical report for additional information.

5.2 VOC Screening

PID soil sample headspace readings are presented in the COC documents attached in the appendices. The PID results ranged from 0.2ppm to 42.8ppm equivalent isobutylene. These results indicate PID detectable volatile organic contaminants. Samples with elevated PID readings were analysed for TRH and BTEX.

5.3 Laboratory Results

The laboratory results were assessed against the criteria referenced in Section 3. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 5-2: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Arsenic	6	0	0	-
Cadmium	6	0	0	-
Chromium	6	0	0	-
Copper	6	NSL	NSL	-
Lead	6	0	0	-
Mercury	6	0	0	-
Nickel	6	0	0	-
Zinc	6	NSL	NSL	-
TRH (C_6-C_9)	6	0	0	-
TRH (C_{10}-C_{36})	6	0	0	-
BTEX	6	0	0	-
Total PAHs	6	0	0	-
Benzo(a)pyrene	6	0	0	-
OCPs & OPPs	6	0	0	-
PCBs	6	0	0	-
Asbestos	6	-	-	Asbestos was not detected in the samples analysed.

N: Total number (primary samples)

NSL: No set limit

Table 5-3: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	N	N > TCLP Criteria	Comments
Arsenic	6	0	-
Cadmium	6	0	-
Chromium	6	0	-
Lead	6	0	-
Mercury	6	0	-
Nickel	6	0	-
Benzo(a)pyrene	6	0	-

N: Total number (primary samples)

Table 5-4: Summary of ASS Laboratory Results

Results	Comments
pH_F and pH_{FOX}	None of the pH_F results were below pH 4, therefore the samples were not indicative of actual ASS. The pH_{FOX} results ranged from pH 3.3 to pH 5.1. Low to medium reaction rates were reported for all samples. A selection of these samples were targeted for further analysis for depth and spatial coverage.
Net Acidity % S-equiv.	Net acidity results exceeded the action criteria of 0.03%w/w in four of the samples analysed. The maximum net acidity result was 0.093%w/w from BH2 (1.8-2.0m) and BH3 (1.6-1.7m).
Net Acidity mol H^+/t	Net acidity results exceeded the action criteria of 18 moles H^+/t in four of the samples analysed. The maximum net acidity result was 58 moles H^+/t from BH3 (1.6-1.7m).
S_{CR}%	The S_{CR}% results ranged from <0.005 to 0.005. These results indicated that the soils did not contain significant oxidisable sulfur concentrations.
Liming Rate	The liming rate required for neutralisation ranged from <0.75kg$CaCO_3$/tonne to 4.4kg$CaCO_3$/tonne.

6 CONCLUSIONS

6.1 Preliminary Waste Classification of Fill

Based on the results of the assessment, and at the time of reporting, the fill material is assigned a preliminary classification of **General Solid Waste (non-putrescible)**. Further assessment is required to confirm this classification prior to off-site disposal of the waste. The anticipated waste quantities should also be confirmed at that time and documented in the report.

6.2 Preliminary Classification of Natural Soil/Bedrock

Based on the scope of work undertaken for this assessment, and at the time of reporting, JKE are of the opinion that the natural soil and bedrock at the site is likely to meet the definition of **VENM** for off-site disposal or re-use purposes. Further assessment is required to confirm this classification prior to off-site disposal of the waste. The anticipated waste quantities should also be confirmed at that time and documented in the report.

6.3 Acid Sulfate Soil

The results of the field tests and other laboratory results identified acidic conditions greater than the action criteria in four natural soil/bedrock samples. However, considering the low S_{CR}% results, which indicates a low oxidisable sulfur concentration, the net acidity exceedances are considered to be indicative of acidic soils rather than potential ASS (PASS). Considering the laboratory results and other lines of evidence, the waste at the site is not considered to contain PASS to a depth of approximately 4mBGL for off-site disposal purposes.

JKE note that the assessment was undertaken for waste classification purposes and was not designed to meet all aspects of the ASS assessment guidelines. Further assessment of ASS may be required to satisfy regulatory requirements for the proposed development.

6.4 Recommendations

The assessment was preliminary in nature and should be confirmed by additional testing prior to off-site disposal of waste in accordance with the NSW EPA requirements.

It is anticipated that there would be two waste streams generated during the proposed development works: fill; and natural soil or bedrock. Careful waste management must occur so that these two waste streams are kept separate during any excavation works.

Any future waste classification assessments should be undertaken by a suitably qualitied contaminated land consultant[10].

6.5 General Information

The waste must be disposed of to a facility licensed by the NSW EPA to accept the waste. It is the responsibility of the receiving facility to ensure that the waste material meets their licence conditions. JKE accepts no liability whatsoever for illegal or inappropriate disposal of material.

Fill and soil disposal costs can be significant and should be assessed at an early stage of the project development to avoid significant future unexpected additional costs.

Material classed as VENM must not be mixed with any fill material (including building rubble) as this will invalidate the VENM classification. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted to inspect the site and provide further advice during excavation.

Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. JKE accepts no liability whatsoever for the unlawful disposal of any waste from any site.

[10] JKE recommend that the consultancy engaged for the work be a member of the Australian Contaminated Land Consultants Associated (ACLCA), and/or the individual undertaking the works be certified under one of the NSW EPA endorsed certified practitioner schemes

7 LIMITATIONS

The report limitations are outlined below:

- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the screening criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa;
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose;
- Copyright in this report is the property of JKE. JKE has used a degree of care, skill and diligence normally exercised by consulting professionals in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report;
- If the client, or any person, provides a copy of this report to any third party, such third party must not rely on this report except with the express written consent of JKE; and
- Any third party who seeks to rely on this report without the express written consent of JKE does so entirely at their own risk and to the fullest extent permitted by law, JKE accepts no liability whatsoever, in respect of any loss or damage suffered by any such third party.

If you have any questions concerning the contents of this letter please do not hesitate to contact us.

Kind Regards

Harley Wang
Environmental Scientist

Vittal Boggaram
Principal Associate

Appendices:

Appendix A: Report Figures
Appendix B: Laboratory Results Summary Tables
Appendix C: Borehole Logs
Appendix D: Laboratory Reports & COC Documents

Appendix A: Report Figures

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

This plan should be read in conjunction with the Environmental report.

Title: **SITE LOCATION PLAN**

Location: 61 DARLEY STREET, MONA VALE, NSW

Project No: E35451B

Figure No: 1

JKEnvironments

PLOT DATE: 2/11/2022 9:39:02 AM DWG FILE: K:\SC EIS JOBS\35000'S\E35451B MONA VALE\CAD\E35451B.DWG

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

0 2 4 6 8 10

SCALE 1:200 @A3 METRES

This plan should be read in conjunction with the Environmental report.

Title: **SAMPLE LOCATION PLAN**

Location: 61 DARLEY STREET, MONA VALE, NSW

Project No: E35451B

Figure No: 2

JKEnvironments

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Appendix B: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ACM:	Asbestos Containing Material
AF:	Asbestos Fines
B(a)P:	Benzo(a)pyrene
CT:	Contaminant Threshold
FA:	Fibrous Asbestos
GSW:	General Solid Waste
kg/L	kilograms per litre
NA:	Not Analysed
NC:	Not Calculated
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
%w/w:	weight per weight
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
pH_{KCL} :	pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} :	pH of filtered 1:20 1M KCl after peroxide digestion
PQL:	Practical Quantitation Limit
RSW:	Restricted Solid Waste
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)

Table Specific Explanations:

Waste Classification and TCLP Table:

- Data assessed using the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014).
- The assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion.
- Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT,

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0.15-0.35	Fill: Silty Clay	<4	<0.4	**26**	**100**	**19**	<0.1	**2**	**16**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH1 - Lab replicate	0.15-0.35	Fill: Silty Clay	<4	<0.4	**15**	**58**	**15**	<0.1	**2**	**13**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH1 - Lab triplicate	0.15-0.35	Fill: Silty Clay	<4	<0.4	**26**	**29**	**14**	<0.1	**2**	**14**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH1	0.8-1.0	Silty Clay	<4	<0.4	**13**	<1	**9**	<0.1	<1	<1	**0.1**	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	**140**	**300**	<100	**440**	<0.2	<0.5	<1	<1	NA
BH2	0.03-0.1	Fill: Silty Sandy Gravel	**9**	<0.4	**29**	**10**	**48**	<0.1	**4**	**29**	**2.6**	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH2	1.4-1.5	Silty Clay	**5**	<0.4	**19**	<1	**15**	<0.1	<1	**3**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH3	0.3-0.5	Fill: Silty Clay	<4	<0.4	**36**	<1	**15**	<0.1	**1**	**5**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH3	1.6-1.7	Siltstone	<4	<0.4	**11**	<1	**9**	<0.1	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	**55**	**130**	<100	**185**	<0.2	<0.5	<1	<1	NA
Total Number of Samples			8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	3
Maximum Value			9	<PQL	36	100	48	<PQL	4	29	2.6	0.3	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	140	300	<PQL	440	<PQL	<PQL	<PQL	<PQL	Not Detected

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**
Concentration above PQL — **Bold**

TABLE S2
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	B(a)P
PQL - Envirolab Services			0.05	0.01	0.01	0.03	0.0005	0.02	0.001
TCLP1 - General Solid Waste			5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste			20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste			>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**							
BH1	0.15-0.35	Fill: Silty Clay	<0.05	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.001
BH1 - Lab replicate	0.15-0.35	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	<0.001
BH1	0.8-1.0	Silty Clay	<0.05	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.001
BH2	0.03-0.1	Fill: Silty Sandy Gravel	<0.05	<0.01	**0.01**	**0.05**	<0.0005	<0.02	<0.001
BH2	1.4-1.5	Silty Clay	<0.05	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.001
BH3	0.3-0.5	Fill: Silty Clay	<0.05	<0.01	**0.01**	<0.03	<0.0005	<0.02	<0.001
BH3	1.6-1.7	Siltstone	<0.05	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.001
Total Number of samples			6	6	6	6	6	6	7
Maximum Value			<PQL	<PQL	0.01	0.05	<PQL	<PQL	<PQL

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**
Concentration above PQL	**Bold**

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TABLE S3
SUMMARY OF LABORATORY RESULTS - ACID SULFATE SOIL ANALYSIS

Soil Texture: Coarse		Analysis	pH_F and pH_{FOX}				pH_{KCL}	Actual Acidity (Titratable Actual Acidity - TAA)	Potential Sulfidic Acidity		Retained Acidity	Acid Neutralising Capacity (ANC_{BT})	a-Net Acidity without ANCE	s-Net Acidity without ANCE	Liming Rate - without ANCE
			pH_F	pH_{FOX}	Reaction	pH_F - pH_{FOX}		(mol H^+/t)	(% SCr)	(mol H^+/t)	(%S_{NAS})	(% $CaCO_3$)	(mol H^+/t)	(%w/w S)	(kg $CaCO_3$/tonne)
National Acid Sulfate Soils Guidance (2018)			-	-	-	-	-	-	-	-	-	-	18	0.03	-
Sample Reference	**Sample (m)**	**Sample Description**													
BH1	0.15-0.35	Fill: Silty Clay	6.8	4.4	Low reaction	2.4	6.5	<5	0.005	3	[NT]	1.6	<5	0.01	<0.75
BH1	0.8-1.0	Silty Clay	5.2	4	Low reaction	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH1	1.5-1.95	Siltstone	5.4	3.9	Low reaction	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH1	2.8-3.0	Sandstone	5.6	4.1	Low reaction	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH1	3.8-4.0	Sandstone	5.1	4	Low reaction	1.1	4.3	48	<0.005	<3	<0.005	[NT]	50.0	0.08	3.8
BH2	0.03-0.1	Fill: Silty Sandy Gravel	7.9	5.1	Medium reaction	2.8	8.7	<5	0.02	10	[NT]	3.4	9.6	0.02	<0.75
BH2	0.5-0.6	Fill: Silty Clay	6.2	4.1	Low reaction	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	1.4-1.5	Silty Clay	5.1	3.9	Low reaction	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	1.8-2.0	Silty Clay	5.5	3.3	Low reaction	2.2	4	49	<0.005	<3	<0.005	[NT]	54.0	0.09	4
BH3	0.3-0.5	Fill: Silty Clay	6	4.7	Low reaction	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH3	0.8-1.0	Silty Clay	5.3	4.2	Low reaction	1.1	4.5	50	<0.005	<3	<0.005	[NT]	50.00	0.08	3.8
BH3	1.3-1.4	Silty Clay	5.6	4.3	Low reaction	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH3	1.6-1.7	Siltstone	5.5	3.9	Low reaction	1.6	4.2	56	<0.005	<3	<0.005	[NT]	58.0	0.09	4.4
Total Number of Samples			13	13	-	13	6	6	6	6	6	6	6	6	6
Minimum Value			5.1	3.3	-	1.1	4	48	0.005	3	<PQL	1.60	9.6	0.005	3.8
Maximum Value			7.9	5.1	-	2.8	8.7	56	0.02	10	<PQL	3.40	58.0	0.093	4.4

Values Exceeding Action Criteria

Appendix C: Borehole Logs

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BOREHOLE LOG

Borehole No. 1

Client: WILLIAMS RIVER STEEL

Project: PROPOSED COMMERCIAL DEVELOPMENT

Location: 61 DARLEY STREET, MONA VALE, NSW

Job No.: 35451L **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 12/10/22 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** B.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING									ASPHALTIC CONCRETE: 150mm.t				NO OBSERVED REINFORCEMENT
								-	FILL: Silty CLAY, medium to high plasticity, red brown, brown and dark brown, trace of fine grained igneous gravel.	w>PL			
								-	CONCRETE: 150mm.t				NO OBSERVED REINFORCEMENT
					N = 10 3,5,5	1		CH	Silty CLAY: high plasticity, grey mottled red brown, trace of fine grained weakly cemented ironstone gravel.	w<PL	Hd	>600 >600 >600	RESIDUAL
					N = 26 10,12,14	2		-	Extremely Weathered siltstone: silty CLAY, medium plasticity, grey and red brown.	XW	Hd	>600 >600 >600	HAWKESBURY SANDSTONE SOIL 'TC' BIT RESISTANCE
						3		-	SANDSTONE: fine to medium grained, grey.	MW	VL		VERY LOW TO LOW RESISTANCE
						4			as above, but with occasional extremely weathered bands.				VERY LOW RESISTANCE
									SANDSTONE: fine to medium grained, grey.		H		HIGH RESISTANCE
						5			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 6.2m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.2m TO 2.2m. CASING 2.2m TO 0.1m. 2mm SAND FILTER PACK 6.2m TO 2.0m. BENTONITE SEAL 2.0m TO 0.1m. COMPLETED WITH A CONCRETED GATIC COVER.
						6							

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CORED BOREHOLE LOG

Borehole No. 1 **2 / 2**

Client: WILLIAMS RIVER STEEL

Project: PROPOSED COMMERCIAL DEVELOPMENT

Location: 61 DARLEY STREET, MONA VALE, NSW

Job No.: 35451L **Core Size:** NMLC **R.L. Surface:** N/A

Date: 12/10/22 **Inclination:** VERTICAL **Datum:** AHD

Plant Type: JK309 **Bearing:** N/A **Logged/Checked By:** B.S./

Water Loss\Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	DEFECT DETAILS: SPACING (mm) (600, 200, 60, 20)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
				START CORING AT 4.70m						
100% RETURN		5		SANDSTONE: fine grained, grey, red brown and orange brown, distinctly bedded at 0-15°.	MW	H	•3.8 •2.1		(4.82m) CS, 0°, 6 mm.t (4.92m) Be, 0°, P, R, Clay Ct (4.94m) Be, 0°, P, R, Clay Ct (5.16m) CS, 0°, 12 mm.t (5.23m) CS, 0°, 6 mm.t (5.46m) CS, 0°, 24 mm.t (5.57m) CS, 0°, 18 mm.t (5.71m) J, 90°, P, Ji (5.84m) Cr, 0°, 13 mm.t	Newport Formation
		6		SANDSTONE: fine grained, grey and orange brown, distinctly bedded at 0-10°, with occasional iron indurated bands.		L - M	•0.40 •0.20 •0.30 •0.40		(6.05m) J, 20°, P, R, Clay FILLED, 40 mm.t (6.00-6.60m) Ji& Jh, 0 - 90°, P/Un, Fe (6.57m) Cr, 0°, 24 mm.t (6.63m) Jx 2, 70 - 90°, P (6.72m) Be, 5°, P, R, Fe Sn	
		7							(6.88m) Be, 0°, P, R, Clay FILLED, 3 mm.t (6.92m) Jh, 20°, Un, R, Fe (7.17m) Bex 2, 0°, Un, R, Fe (7.23m) Jx 2, 30°, P, R, Fe Sn (7.25m) J, 45°, P, R, Fe Sn	
		8					•0.20 •0.30		(7.65m) Be, 0°, P, R, Fe (7.73m) Be, 0°, P, R, Fe Sn (7.87m) Be, 0°, P, R, Clay FILLED, 4 mm.t (7.95m) Be, 0°, P, R, Clay FILLED, 4 mm.t (8.00m) XWS, 0°, 24 mm.t (8.20m) Be, 0°, P, R, Fe Sn (8.25m) Be, 0°, P, R, Fe Sn (8.45m) Be, 15°, P, Fe Sn (8.51m) J, 30°, P, R, Fe Sn (8.65m) Cr, 0°, 8 mm.t	
		9					•0.20 •1.6 •0.50 •0.40		(8.77-8.87m) ROCK IS FRACTURED, SEVERAL Be, 0 - 10°, P, R, Fe Sn, & J, 0-70°, P, Un, R, Fe, Sn (9.12m) Be, 0°, P, R, Fe Sn (9.26m) Cr, 0°, 9 mm.t (9.81m) Bex 2, 20°, Un, R, Fe Sn (9.95m) Cr, 0°, 8 mm.t	
		10		END OF BOREHOLE AT 10.00 m						

JK 9.02.4 LIB:GLB Log JK CORED BOREHOLE - MASTER 35451L MONA VALE.GPJ <<DrawingFile>> 08/12/2022 14:57 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No. 2

1 / 1

Client: WILLIAMS RIVER STEEL

Project: PROPOSED COMMERCIAL DEVELOPMENT

Location: 61 DARLEY STREET, MONA VALE, NSW

Job No.: 35451L **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 12/10/22 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** B.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION								-	ASPHALTIC CONCRETE: 30mm.t	M			NO OBSERVED REINFORCEMENT
									FILL: Silty sandy gravel, fine to coarse grained, dark grey, igneous gravel, fine to medium grained sand.	w>PL			
					N = 7 3,3,4			CH	FILL: Silty clay, medium plasticity, dark grey, trace of fine to coarse grained igneous and ironstone gravel, fine grained sand and ash.	w>PL	St - VSt	190 180 210	RESIDUAL
						1			Silty CLAY: high plasticity, orange brown and brown, trace of fine grained ironstone gravel.		VSt	240 300 310	
									as above, but grey mottled red brown.				
					N > 17 3,13,4/ 0mm REFUSAL			CI	Silty CLAY: medium plasticity, grey, trace of iron indurated bands and extremely weathered siltstone bands, trace of root fibres.		VSt - Hd	420 350 350	
						2		-	Extremely weathered siltstone: silty CLAY, medium plasticity, grey and red brown, with iron indurated bands and extremely weathered sandstone bands.	XW	Hd		HAWKESBURY SANDSTONE VERY LOW 'TC' BIT RESISTANCE WITH LOW BANDS
					N > 21 17,21/ 150mm REFUSAL	3						>600 >600 >600	
								-	SANDSTONE: fine grained, red brown.	MW	H		HIGH RESISTANCE
									END OF BOREHOLE AT 3.60 m				'TC' BIT REFUSAL GROUNDWATER MONITORING WELL INSTALLED TO 3.6m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.6m TO 2.1m. CASING 2.1m TO 0.1m. 2mm SAND FILTER PACK 2.6m TO 2.2m. BENTONITE SEAL 2.2m TO 0m. COMPLETED WITH A CONCRETED GATIC COVER.
						4							
						5							
						6							

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BOREHOLE LOG

Borehole No. 3

1 / 1

Client: WILLIAMS RIVER STEEL

Project: PROPOSED COMMERCIAL DEVELOPMENT

Location: 61 DARLEY STREET, MONA VALE, NSW

Job No.: 35451L **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 12/10/22 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** B.S.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION AND AFTER 2 HRS	■							-	ASPHALTIC CONCRETE: 10mm.t FILL: Silty clay, low to medium plasticity, dark grey, fine to medium grained igneous gravel, fine grained sand and ash.	w~PL			NO OBSERVED REINFORCEMENT
	■			■	N = 8 8,3,5			CH	Silty CLAY: high plasticity, red brown and orange brown, trace of fine to coarse grained ironstone gravel, with iron indurated bands.	w~PL	VSt - Hd	400 410 400	RESIDUAL
						1							
	■			■	N > 4 8,4/ 50mm REFUSAL			-	Extremely Weathered siltstone: silty CLAY, medium plasticity, grey, with iron indurated bands, trace of fine grained sand.	XW	Hd	>600 >600 >600	HAWKESBURY SANDSTONE
				■				-	SANDSTONE: fine to medium grained, red brown.	MW	H		SOIL 'TC' BIT RESISTANCE
						2			END OF BOREHOLE AT 1.90 m				HIGH RESISTANCE 'TC' BIT REFUSAL GROUNDWATER MONITORING WELL INSTALLED TO 1.9m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.9m TO 1.4m. CASING 1.4m TO 0.1m. 2mm SAND FILTER PACK 1.9m TO 1.4m. BENTONITE SEAL 1.4m TO 0.1m. COMPLETED WITH A CONCRETED GATIC COVER.
						3							
						4							
						5							
						6							

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the

structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm 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 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

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

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- 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 be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_U = \frac{D_{60}}{D_{10}} \qquad and \qquad C_C = \frac{(D_{30})^2}{D_{10}\, D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

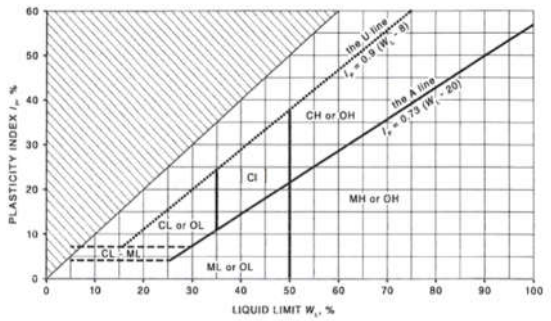
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
		Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
	PFAS	Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL $w \approx$ PL w < PL $w \approx$ LL w > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

Log Column	Symbol	Definition
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as: RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock. EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock. ALLUVIAL – soil deposited by creeks and rivers. ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents. MARINE – soil deposited in a marine environment. AEOLIAN – soil carried and deposited by wind. COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits. LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
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	Distinctly Weathered (Note 1)	HW	DW	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		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'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 weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix D: Laboratory Reports & COC Documents

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CERTIFICATE OF ANALYSIS 307977

Client Details

Client	JK Environments
Attention	Harley Wang
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35451B, Mona Vale**
Number of Samples	26 Soil
Date samples received	13/10/2022
Date completed instructions received	13/10/2022

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	20/10/2022
Date of Issue	20/10/2022

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Analysed by Asbestos Approved Analyst: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Diego Bigolin, Inorganics Supervisor
Giovanni Agosti, Group Technical Manager
Hannah Nguyen, Metals Supervisor
Kyle Gavrily, Senior Chemist
Liam Timmins, Organic Instruments Team Leader
Loren Bardwell, Development Chemist
Lucy Zhu, Asbestos Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	18/10/2022	18/10/2022	18/10/2022	18/10/2022	18/10/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	111	108	98	111	122

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	18/10/2022
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	98

svTRH (C10-C40) in Soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	18/10/2022	17/10/2022	17/10/2022
TRH C_{10} - C_{14}	mg/kg	<50	140	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	300	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	440	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	240	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	240	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	200	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	440	<50	<50	<50
Surrogate o-Terphenyl	%	85	98	76	86	86

svTRH (C10-C40) in Soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	17/10/2022
TRH C_{10} - C_{14}	mg/kg	55
TRH C_{15} - C_{28}	mg/kg	130
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	190
TRH >C_{10} -C_{16}	mg/kg	100
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	100
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	100
Surrogate o-Terphenyl	%	91

PAHs in Soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
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	0.2	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.4	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.3	<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	0.2	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.1	2.6	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	92	93	83	94	87

PAHs in Soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	17/10/2022
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	89

Organochlorine Pesticides in soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	94	97	98	96

Organochlorine Pesticides in soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	17/10/2022
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	94

Organophosphorus Pesticides in Soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	94	97	98	96

Organophosphorus Pesticides in Soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	17/10/2022
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	94

PCBs in Soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	94	97	98	96

PCBs in Soil		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	17/10/2022
Date analysed	-	17/10/2022
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	94

Acid Extractable metals in soil						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	19/10/2022	19/10/2022	19/10/2022	19/10/2022	19/10/2022
Arsenic	mg/kg	<4	<4	9	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	26	13	29	19	36
Copper	mg/kg	100	<1	10	<1	<1
Lead	mg/kg	19	9	48	15	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	<1	4	<1	1
Zinc	mg/kg	16	<1	29	3	5

Acid Extractable metals in soil			
Our Reference		307977-26	307977-27
Your Reference	UNITS	BH3	BH1 - [TRIPLICATE]
Depth		1.6-1.7	0.15-0.35
Date Sampled		12/10/2022	12/10/2022
Type of sample		Soil	Soil
Date prepared	-	17/10/2022	17/10/2022
Date analysed	-	19/10/2022	19/10/2022
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	11	26
Copper	mg/kg	<1	29
Lead	mg/kg	9	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	<1	2
Zinc	mg/kg	<1	14

Moisture						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	18/10/2022	18/10/2022	18/10/2022	18/10/2022	18/10/2022
Moisture	%	21	17	22	18	12

Moisture		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date prepared	-	17/10/2022
Date analysed	-	18/10/2022
Moisture	%	14

Asbestos ID - soils				
Our Reference		307977-1	307977-11	307977-23
Your Reference	UNITS	BH1	BH2	BH3
Depth		0.15-0.35	0.03-0.1	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil
Date analysed	-	18/10/2022	18/10/2022	18/10/2022
Sample mass tested	g	Approx. 145g	Approx. 160g	Approx. 135g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Metals from Leaching Fluid pH 2.9 or 5						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022
Date analysed	-	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022
pH of soil for fluid# determ.	pH units	8.6	7.8	7.0	5.9	6.3
pH of soil TCLP (after HCl)	pH units	1.6	1.6	1.6	1.6	1.6
Extraction fluid used		1	1	1	1	1
pH of final Leachate	pH units	5.0	5.0	5.0	5.0	5.0
Arsenic	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	mg/L	<0.01	<0.01	0.01	<0.01	0.01
Lead	mg/L	<0.03	<0.03	0.05	<0.03	<0.03
Mercury	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02

Metals from Leaching Fluid pH 2.9 or 5		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	20/10/2022
Date analysed	-	20/10/2022
pH of soil for fluid# determ.	pH units	6.8
pH of soil TCLP (after HCl)	pH units	1.6
Extraction fluid used		1
pH of final Leachate	pH units	5.0
Arsenic	mg/L	<0.05
Cadmium	mg/L	<0.01
Chromium	mg/L	<0.01
Lead	mg/L	<0.03
Mercury	mg/L	<0.0005
Nickel	mg/L	<0.02

PAHs in TCLP (USEPA 1311)						
Our Reference		307977-1	307977-3	307977-11	307977-15	307977-23
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	0.8-1.0	0.03-0.1	1.4-1.5	0.3-0.5
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/10/2022	19/10/2022	19/10/2022	19/10/2022	19/10/2022
Date analysed	-	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	86	83	82	81	79

PAHs in TCLP (USEPA 1311)		
Our Reference		307977-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date extracted	-	19/10/2022
Date analysed	-	20/10/2022
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	74

sPOCAS field test						
Our Reference		307977-1	307977-3	307977-5	307977-7	307977-11
Your Reference	UNITS	BH1	BH1	BH1	BH1	BH2
Depth		0.15-0.35	0.8-1.0	1.5-1.95	2.8-3.0	0.03-0.1
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
pH_F (field pH test)	pH Units	6.8	5.2	5.4	5.6	7.9
pH_{FOX} (field peroxide test)	pH Units	4.4	4.0	3.9	4.1	5.1
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Medium reaction

sPOCAS field test						
Our Reference		307977-13	307977-15	307977-17	307977-23	307977-24
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.5-0.6	1.4-1.5	1.8-2.0	0.3-0.5	0.8-1.0
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022	17/10/2022	17/10/2022	17/10/2022
pH_F (field pH test)	pH Units	6.2	5.1	5.5	6.0	5.3
pH_{FOX} (field peroxide test)	pH Units	4.1	3.9	3.3	4.7	4.2
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Low reaction

sPOCAS field test			
Our Reference		307977-25	307977-26
Your Reference	UNITS	BH3	BH3
Depth		1.3-1.4	1.6-1.7
Date Sampled		12/10/2022	12/10/2022
Type of sample		Soil	Soil
Date prepared	-	17/10/2022	17/10/2022
Date analysed	-	17/10/2022	17/10/2022
pH_F (field pH test)	pH Units	5.6	5.5
pH_{FOX} (field peroxide test)	pH Units	4.3	3.9
Reaction Rate*	-	Low reaction	Low reaction

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-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311. Please note that the mass used may be scaled down from default based on sample mass available. Samples are stored at 2-6oC before and after leachate preparation.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. Based on section H, Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of various metals by ICP-AES following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-021	Determination of Mercury by Cold Vapour AAS following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			18/10/2022	1	18/10/2022	18/10/2022		18/10/2022	18/10/2022
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	93	98
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	93	98
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	106	113
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	98	104
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	83	88
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	88	93
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	92	97
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	110	1	111	112	1	114	115

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	99	78
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	103	97
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	88	85
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	99	78
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	103	97
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	88	85
Surrogate o-Terphenyl	%		Org-020	88	1	85	85	0	85	98

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	107
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	103
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	115
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	126
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	104
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	105	113
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	77
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	<0.05	<0.05	0	98	92
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	104	1	92	90	2	85	85

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	110
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	110
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	91	101
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	109	122
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	106	116
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	117
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	114	118
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	74	78
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	98
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	68
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	97	1	98	95	3	93	89

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	109	109
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	109
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	81	92
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	93	70
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	122
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	87	122
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	130
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	97	1	98	95	3	93	89

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date extracted	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	106	120
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	97	1	98	95	3	93	89

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	307977-3
Date prepared	-			17/10/2022	1	17/10/2022	17/10/2022		17/10/2022	17/10/2022
Date analysed	-			19/10/2022	1	19/10/2022	19/10/2022		19/10/2022	19/10/2022
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	93	70
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	91	75
Chromium	mg/kg	1	Metals-020	<1	1	26	15	54	98	76
Copper	mg/kg	1	Metals-020	<1	1	100	58	53	95	78
Lead	mg/kg	1	Metals-020	<1	1	19	15	24	97	77
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	88	80
Nickel	mg/kg	1	Metals-020	<1	1	2	2	0	97	75
Zinc	mg/kg	1	Metals-020	<1	1	16	13	21	92	71

QUALITY CONTROL: Metals from Leaching Fluid pH 2.9 or 5					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/10/2022	[NT]	[NT]	[NT]	[NT]	20/10/2022	[NT]
Date analysed	-			20/10/2022	[NT]	[NT]	[NT]	[NT]	20/10/2022	[NT]
Arsenic	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cadmium	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Chromium	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	87	[NT]
Lead	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	94	[NT]
Mercury	mg/L	0.0005	Metals-021	<0.0005	[NT]	[NT]	[NT]	[NT]	113	[NT]
Nickel	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			19/10/2022	1	19/10/2022	19/10/2022		19/10/2022	[NT]
Date analysed	-			20/10/2022	1	20/10/2022	20/10/2022		20/10/2022	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	86	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	85	[NT]
Fluorene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	88	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	98	[NT]
Anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	92	[NT]
Pyrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	99	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	99	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-022/025	<0.002	1	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	86	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	93	1	86	81	6	95	[NT]

QUALITY CONTROL: sPOCAS field test						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			17/10/2022	[NT]	[NT]	[NT]	[NT]	17/10/2022	[NT]
Date analysed	-			17/10/2022	[NT]	[NT]	[NT]	[NT]	17/10/2022	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	101	[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

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 307977-1 for Cu and Cr. Therefore a triplicate result has been issued as laboratory sample number 307977-27.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Harley Wang

Sample Login Details

Your reference	E35451B, Mona Vale
Envirolab Reference	307977
Date Sample Received	13/10/2022
Date Instructions Received	13/10/2022
Date Results Expected to be Reported	20/10/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	26 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	7
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Metals from Leaching Fluid pH 2.9 or 5	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	sPOCAS field test	On Hold
BH1-0.15-0.35	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH1-0.6-0.7																												✓
BH1-0.8-1.0	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH1-1.3-1.5																												✓
BH1-1.5-1.95																											✓	
BH1-2.4-2.6																												✓
BH1-2.8-3.0																											✓	
BH1-3.3-3.5																												✓
BH1-3.8-4.0																												✓
BH1-4.6-4.7																												✓
BH2-0.03-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2-0.3-0.5																												✓
BH2-0.5-0.6																											✓	
BH2-0.8-1.0																												✓
BH2-1.4-1.5	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2-1.5-1.8																												✓
BH2-1.8-2.0																											✓	
BH2-2.3-2.5																												✓
BH2-2.8-3.0																												✓
BH2-3.0-3.3																												✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Metals from Leaching Fluid pH 2.9 or 5	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	sPOCAS field test	On Hold
BH2-3.5-3.6																												✓
BH3-0.07-0.2																												✓
BH3-0.3-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH3-0.8-1.0																											✓	
BH3-1.3-1.4																											✓	
BH3-1.6-1.7	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35451B Date Results Required: STANDARD Page: 1 of 1	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Harley Wang hwang@jkenvironments.com.au

Location:	Mona Vale	Sample Preserved in Esky on Ice																
Sampler:	NF	Tests Required																
Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 13a	Combo 13	pH field test (pHF apHFOX)									
12/10/2022	1	BH1	0.15-0.35	G, A, P	0.2	F: Silty Clay	X		X									
12/10/2022	2	BH1	0.6-0.7	G, A, P	0.2	Silty CLAY												
12/10/2022	3	BH1	0.8-1.0	G, A, P	42.8	Silty CLAY		X	X									
12/10/2022	4	BH1	1.3-1.5	P	NA	XW Sandstone												
12/10/2022	5	BH1	1.5-1.95	P	NA	XW Sandstone			X									
12/10/2022	6	BH1	2.4-2.6	P	NA	Sandstone												
12/10/2022	7	BH1	2.8-3.0	P	NA	Sandstone			X									
12/10/2022	8	BH1	3.3-3.5	P	NA	Sandstone												
12/10/2022	9	BH1	3.8-4.0	P	NA	Sandstone												
12/10/2022	10	BH1	4.6-4.7	P	NA	Sandstone												
12/10/2022	11	BH2	0.03-0.1	G, A, P	1.8	F: Silty Sandy Gravel	X		X									
12/10/2022	12	BH2	0.3-0.5	G, A, P	1.1	F: Silty Clay												
12/10/2022	13	BH2	0.5-0.6	G, P	0.3	F: Silty Clay			X									
12/10/2022	14	BH2	0.8-1.0	G, A, P	0.4	Silty CLAY												
12/10/2022	15	BH2	1.4-1.5	G, P	0.2	Silty CLAY		X	X									
12/10/2022	16	BH2	1.5-1.8	P	NA	Silty CLAY												
12/10/2022	17	BH2	1.8-2.0	P	NA	Silty CLAY			X									
12/10/2022	18	BH2	2.3-2.5	P	NA	XW Siltstone												
12/10/2022	19	BH2	2.8-3.0	P	NA	XW Siltstone												
12/10/2022	20	BH2	3.0-3.3	P	NA	XW Siltstone												
12/10/2022	21	BH2	3.5-3.6	P	NA	Sandstone												
12/10/2022	22	BH3	0.07-0.2	G, A, P	0.2	F: Silty Clay												
12/10/2022	23	BH3	0.3-0.5	G, A, P	0.1	F: Silty Clay	X		X									
12/10/2022	24	BH3	0.8-1.0	G, A, P	0.1	Silty CLAY			X									
12/10/2022	25	BH3	1.3-1.4	G, A, P	0.2	Silty CLAY			X									
12/10/2022	26	BH3	1.6-1.7	G, P	31.4	XW Siltstone		X	X									

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By: HW	Date: 13/10/22 4:16pm	Time: 1320	Received By:	Date: 13-10-22

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

Job No: 307977
Date Received: 13-10-22
Time Received: 1320
Received By: DH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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CERTIFICATE OF ANALYSIS 307977-A

Client Details

Client	JK Environments
Attention	Harley Wang
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35451B, Mona Vale**
Number of Samples	additional analysis
Date samples received	13/10/2022
Date completed instructions received	21/10/2022

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	28/10/2022
Date of Issue	02/11/2022
Reissue Details	This report replaces R00 created on 28/10/2022 due to: revised report with additional results.

Results Approved By
Nick Sarlamis, Assistant Operation Manager
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

sPOCAS field test		
Our Reference		307977-A-9
Your Reference	UNITS	BH1
Depth		3.8-4.0
Date Sampled		12/10/2022
Type of sample		Soil
Date prepared	-	02/11/2022
Date analysed	-	02/11/2022
pH_F (field pH test)	pH Units	5.1
pH_{FOX} (field peroxide test)	pH Units	4.0
Reaction Rate*	-	Low reaction

Chromium Suite						
Our Reference		307977-A-1	307977-A-9	307977-A-11	307977-A-17	307977-A-24
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.15-0.35	3.8-4.0	0.03-0.1	1.8-2.0	0.8-1.0
Date Sampled		12/10/2022	12/10/2022	12/10/2022	12/10/2022	12/10/2022
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022
Date analysed	-	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022
pH $_{kcl}$	pH units	6.5	4.3	8.7	4.0	4.5
s-TAA pH 6.5	%w/w S	<0.01	0.08	<0.01	0.08	0.08
TAA pH 6.5	moles H^+ /t	<5	48	<5	49	50
Chromium Reducible Sulfur	%w/w	0.005	<0.005	0.02	<0.005	<0.005
a-Chromium Reducible Sulfur	moles H^+ /t	3	<3	10	<3	<3
S_{HCl}	%w/w S	[NT]	0.006	[NT]	0.008	0.013
S_{KCl}	%w/w S	[NT]	0.008	[NT]	0.005	0.015
S_{NAS}	%w/w S	[NT]	<0.005	[NT]	<0.005	<0.005
ANC_{BT}	% $CaCO_3$	1.6	[NT]	3.4	[NT]	[NT]
s-ANC_{BT}	%w/w S	0.50	[NT]	1.1	[NT]	[NT]
s-Net Acidity	%w/w S	<0.005	0.081	<0.005	0.086	0.081
a-Net Acidity	moles H^+ /t	<5	50	<5	54	50
Liming rate	kg $CaCO_3$ /t	<0.75	4	<0.75	4	4
a-Net Acidity without ANCE	moles H^+ /t	<5	50	9.6	54	50
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	3.8	<0.75	4.0	3.8
s-Net Acidity without ANCE	%w/w S	0.0050	0.081	0.015	0.086	0.081

Chromium Suite		
Our Reference		307977-A-26
Your Reference	UNITS	BH3
Depth		1.6-1.7
Date Sampled		12/10/2022
Type of sample		Soil
Date prepared	-	28/10/2022
Date analysed	-	28/10/2022
pH $_{kcl}$	pH units	4.2
s-TAA pH 6.5	%w/w S	0.09
TAA pH 6.5	moles H^+ /t	56
Chromium Reducible Sulfur	%w/w	<0.005
a-Chromium Reducible Sulfur	moles H^+ /t	<3
S_{HCl}	%w/w S	0.011
S_{KCl}	%w/w S	0.011
S_{NAS}	%w/w S	<0.005
ANC_{BT}	% $CaCO_3$	[NT]
s-ANC_{BT}	%w/w S	[NT]
s-Net Acidity	%w/w S	0.093
a-Net Acidity	moles H^+ /t	58
Liming rate	kg $CaCO_3$ /t	4
a-Net Acidity without ANCE	moles H^+ /t	58
Liming rate without ANCE	kg $CaCO_3$ /t	4.4
s-Net Acidity without ANCE	%w/w S	0.093

Method ID	Methodology Summary
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. Based on section H, Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate. Based on National acid sulfate soils identification and laboratory methods manual June 2018. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL results reported.

QUALITY CONTROL: sPOCAS field test						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			02/11/2022	[NT]	[NT]	[NT]	[NT]	02/11/2022	[NT]
Date analysed	-			02/11/2022	[NT]	[NT]	[NT]	[NT]	02/11/2022	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Chromium Suite						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			28/10/2022	[NT]	[NT]	[NT]	[NT]	28/10/2022	[NT]
Date analysed	-			28/10/2022	[NT]	[NT]	[NT]	[NT]	28/10/2022	[NT]
pH $_{kcl}$	pH units		Inorg-068	[NT]	[NT]	[NT]	[NT]	[NT]	97	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-068	<5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	111	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_{BT}	% $CaCO_3$	0.05	Inorg-068	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_{BT}	%w/w S	0.05	Inorg-068	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-068	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-068	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[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.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Harley Wang

Sample Login Details

Your reference	E35451B, Mona Vale
Envirolab Reference	307977-A
Date Sample Received	13/10/2022
Date Instructions Received	21/10/2022
Date Results Expected to be Reported	28/10/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	additional analysis
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	7
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	Chromium Suite	On Hold
BH1-0.15-0.35	✓	
BH1-0.6-0.7		✓
BH1-0.8-1.0		✓
BH1-1.3-1.5		✓
BH1-1.5-1.95		✓
BH1-2.4-2.6		✓
BH1-2.8-3.0		✓
BH1-3.3-3.5		✓
BH1-3.8-4.0	✓	
BH1-4.6-4.7		✓
BH2-0.03-0.1	✓	
BH2-0.3-0.5		✓
BH2-0.5-0.6		✓
BH2-0.8-1.0		✓
BH2-1.4-1.5		✓
BH2-1.5-1.8		✓
BH2-1.8-2.0	✓	
BH2-2.3-2.5		✓
BH2-2.8-3.0		✓
BH2-3.0-3.3		✓
BH2-3.5-3.6		✓
BH3-0.07-0.2		✓
BH3-0.3-0.5		✓
BH3-0.8-1.0	✓	
BH3-1.3-1.4		✓
BH3-1.6-1.7	✓	
BH1 - [TRIPLICATE]-0.15-0.35		✓

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

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Additional Info

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

Ming To

From: Harley Wang <HWang@jkenvironments.com.au>
Sent: Friday, 21 October 2022 10:35 AM
To: Nancy Zhang
Cc: Samplereceipt
Subject: RE: Results for Registration 307977 E35451B, Mona Vale

Categories: Additional

Ref: 307977-A
TAT: Standard.
Due: 28/10/2022
MT

Hi Nancy,

Can I please get the following additional analysis underway:

Sample number:	Depth:	Lab ref:	Analysis:
BH1	0.15-0.35	1 (1)	Chromium reducible sulfur (S_{CR})
BH1	3.8-4.0	9 (9)	pH field test (pH_F and pH_{FOX}) and Chromium reducible sulfur (S_{CR})
BH2	0.03-0.1	11 (11)	Chromium reducible sulfur (S_{CR})
BH2	1.8-2.0	17 (17)	Chromium reducible sulfur (S_{CR})
BH3	0.8-1.0	24 (24)	Chromium reducible sulfur (S_{CR})
BH3	1.6-1.7	26 (26)	Chromium reducible sulfur (S_{CR})

Analysis on a standard TAT please.

Regards
Harley Wang
Environmental Scientist

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E: HWang@jkenvironments.com.au
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JKEnvironments