REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

DETAILED SITE INVESTIGATION

FOR

ULLADULLA HIGH SCHOOL UPGRADES

AT

55 SOUTH STREET, ULLADULLA, NSW

Date: 20 March 2025

Ref: E36217PTrpt5-DSI

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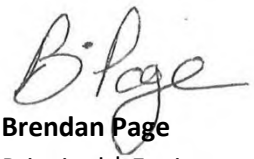

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E36217PTrpt-DSI DRAFT	Draft Report	7 January 2025
E36217PTrpt-DSI	Final Report	20 March 2025

Executive Summary

NSW Department of Education ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the upgrades at Ulladulla High School, 55 South Street, Ulladulla, NSW ('the site'). The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2 in Appendix A.

This report has been prepared to support the Review of Environmental Factors (REF) for the activity described in Section 1, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021 (formerly known as SEPP55).

A Sampling Analysis Quality Plan (SAQP) was prepared for this investigation (Ref: E36217PTrpt4-SAQP, dated 28 November 2024). The SAQP is attached in Appendix G.

It is understood the proposed activity includes a new two-storey classroom on the north-western side of the existing building cluster on the wider school property. An elevated walkway is proposed to link the first-floor level of the new building with the existing two-storey Block M (to the south-east). For the purpose of the DSI, the site captures the proposed activity footprint only, as instructed by the client.

The primary aims of the investigation were to characterise the soil contamination conditions in order to assess site risks in relation to contamination and inform the preparation of a Remediation Action Plan (RAP) if required. A secondary aim was to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during the proposed activity works. The DSI objectives were to:

- Assess the current site conditions and use(s) via a site walkover inspection;
- Summarise potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Document an iteration and review of the conceptual site model (CSM);
- Assess the soil contamination conditions via implementation of a sampling and analysis program;
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether the site is suitable or can be made suitable for the proposed activity (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

The scope of work included the following: review of site information, including background and site history information from various sources outlined in the report; preparation of a CSM; design and implementation of a SAQP; interpretation of the analytical results against the adopted Site Assessment Criteria (SAC); Data Quality Assessment; and preparation of a report including a Tier 1 risk assessment.

JKE has previously undertaken a Preliminary (Desktop) Site Investigation and Preliminary (Intrusive) Site Investigation at the site. A summary of this information has been included in Section 3. The following potential contamination sources/AEC were identified: fill material; use of pesticides; and hazardous building materials.

Soil sampling was undertaken from four boreholes drilled with hand tools or a large diameter (300mm) pendulum auger attachment on an excavator. The boreholes generally encountered fill material to depths of between 0.1m to 0.6m below ground level (BGL), underlain by residual clayey and sandy soils to the maximum termination depth of the investigation at 1.0mBGL. The fill contained inclusions of igneous sandstone and ironstone cobbles, ironstone gravel, sand, ash, roots and root fibres. Minor traces of plastic were found in a few locations.

A selection of soil samples was analysed for the CoPC identified in the CSM. Elevated concentrations of the CoPC were not encountered above the adopted SAC.

Based on the Tier 1 risk assessment, JKE is of the opinion that potential risks associated with the CoPC at the site are low and the data collected during the investigations were assessed to pose a low risk to the receptors. Unacceptable risks, warranting remediation, were not identified.

Further investigation and/or remediation is not considered to be required and the site is considered to be suitable for the proposed activity outlined in Section 1.2, from a contamination viewpoint. We recommend that a robust Unexpected Finds Protocol (UFP) be prepared by a suitably qualified environmental consultant and that this protocol be implemented during the development/ construction phase of the project.

Preliminary waste classifications are discussed in Section 9. In JKE's opinion, all fill will classify as 'General Solid Waste (non-putrescible)'. Confirmatory waste classification assessment is required prior to off-site disposal of any waste as final waste classification documentation, including the waste volume, will need to be provided to the receiving facility.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of this report.

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Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Before You Dig Australia	**BYDA**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environment Protection Authority	**EPA**
Fibre Cement Fragment(s)	**FCF**
Finished Floor Level	**FFL**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Local Government Area	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
NSW Department of Education	**DoE**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCB**
Per-and Polyfluoroalkyl Substances	**PFAS**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Review of Environmental Factors	**REF**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**

Site Audit Report	**SAR**
State Environmental Planning Policy	**SEPP**
Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Standard Penetration Test	**SPT**
Standing Water Level	**SWL**
Trichloroethene	**TCE**
Trip Blank	**TB**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millilitres	**ml or mL**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 CLIENT SUPPLIED INTRODUCTION

This Detailed Site Investigation (DSI) has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for Ulladulla High School upgrade (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37 of the T&I SEPP.

The activity will be carried out at Ulladulla High School located 55 South Street, Ulladulla (the site)[1].

The purpose of this report is to make a detailed assessment of site contamination.

1.1 Client Provided Site Description

Ulladulla High School is located at 55 South Street, Ulladulla NSW 2539 and is legally referred to as Lot 1 in DP595313. The site is located within the Shoalhaven Local Government Area (LGA) and has an approximate area of 5 hectares. An aerial photograph of the site is provided at Figure 1 (below insert).

The site is zoned SP2 Educational Establishment and existing development comprises various buildings, a car park, landscaping, sports fields and sports courts associated with Ulladulla High School. Ulladulla High School currently comprises 61 Permanent Teaching Spaces and eight Demountable Teaching Spaces. Playing fields are located in the north western portion of the site.

The site is largely rectangular in shape, however, is indented in the north east corner where an early learning centre is situated outside of the site boundary on the corner of Green Street and St Vincent Street. The primary frontage to the school is along St Vincent Street to the east, with two vehicular access points to at-grade carparking areas.

Dense vegetation is located in the central and eastern portion of the site, separating the school buildings from the early learning centre. Vegetation is also concentrated along the site boundaries and around the playing fields. The surrounding locality is primarily residential to the west and south. Ulladulla Town Centre is located to the east of the site. Ulladulla Public School is located to the north of site opposite Green Street.

1 In the context of the DSI, this area is referred to as the wider school property, and 'the site' for the DSI includes only the proposed development/activity footprint as defined in Figure 2 in Appendix A

Figure 1 Aerial Photograph of the Site
Source: Urbis, January, 2024

1.2 Proposed Activity Description

The proposed activity relates to upgrades to Ulladulla High School. Specifically, the proposed activity comprises the following:

- Construction of a new two-storey home base building;
- Construction of new stairs and covered walkways;
- Upgrade works to existing internal pedestrian pathways;
- Installation of solar panels; and
- External landscape works.

Any works relating to the existing demountables or associated with substations will be undertaken via a separate planning pathway. Figure 2 (below insert), provides an extract of the proposed site plan.

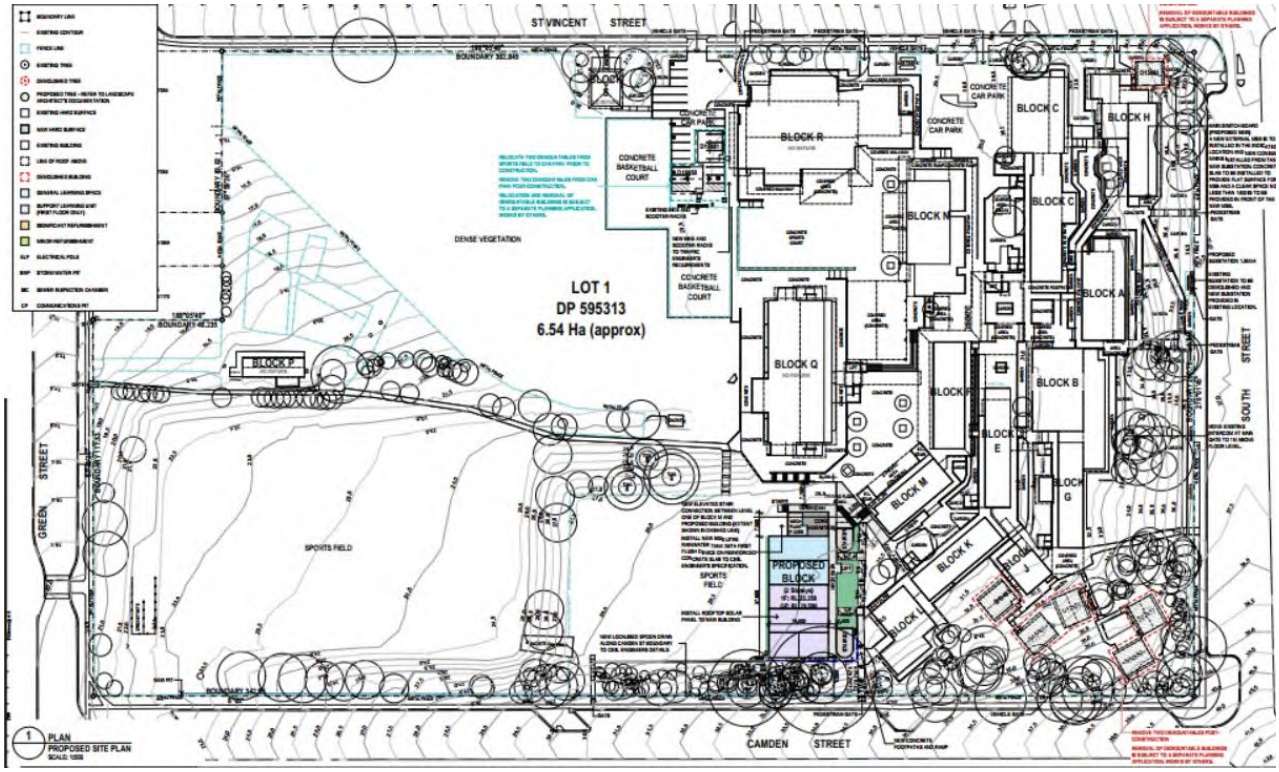


Figure 2 Proposed Building Site Plan
Source: Fulton Trotter, 2025

2 INTRODUCTION

NSW Department of Education ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the upgrades at Ulladulla High School, 55 South Street, Ulladulla, NSW ('the site'). The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2 in Appendix A.

This report has been prepared to support the REF for the activity described in Section 1, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[2] (formerly known as SEPP55).

A Sampling Analysis Quality Plan (SAQP) was prepared for this investigation (Ref: E36217PTrpt4-SAQP, dated 28 November 2024)[3]. The SAQP is attached in Appendix G.

JKE has previously undertaken a Preliminary (Desktop) Site Investigation and Preliminary (Intrusive) Site Investigation at the site. A summary of this information has been included in Section 3.

2.1 Aims and Objectives

The primary aims of the investigation were to characterise the soil contamination conditions in order to assess site risks in relation to contamination and inform the preparation of a Remediation Action Plan (RAP) if required. A secondary aim was to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during the proposed activity works.

The DSI objectives were to:

- Assess the current site conditions and use(s) via a site walkover inspection;
- Summarise potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Document an iteration and review of the conceptual site model (CSM);
- Assess the soil contamination conditions via implementation of a sampling and analysis program;
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether the site is suitable or can be made suitable for the proposed activity (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

2.2 Scope of Work

The investigation was undertaken generally in accordance with the work order (DDWO06919/24) dated 28 November 2024. The scope of work included the following:

- Review of site information, including background and site history information from various sources outlined in the report;
- Preparation of a CSM;

[2] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as SEPP Resilience and Hazards 2021)
[3] JKE, (2024). *Report to NSW Department of Education, on Sampling, Analysis and Quality Plan (SAQP) for Detailed Site Investigation for Ulladulla High School at 55 South Street, Ulladulla, NSW*. (Report ref: E36217PTrpt4-SAQP, dated 28 November 2024) (referred to as SAQP)

- Design and implementation of a SAQP;
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[4], SEPP Resilience and Hazards 2021 and other guidelines made under or with regards to the Contaminated Land Management Act (1997)[5]. A list of reference documents/guidelines is included in the appendices.

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

[5] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

3 SITE INFORMATION

3.1 Background

A summary of relevant information from the previous JKE investigations is outlined in the table below:

Table 3-1: Previous information summary

Report	Summary of relevant information
Preliminary (Desktop) Site Investigation, 2023[6]	A desktop investigation was undertaken by JKE in August 2023 for the wider school property. The Desktop included a review of historical information and other relevant information for the wider school property, a walkover inspection, and preparation of a preliminary CSM. During the site information review, JKE identified an existing asbestos register for the buildings and structures on the wider school property that indicated the site buildings did not contain asbestos, but buildings and structures on the wider school property did. The site history review indicated that the site and wider school property was likely utilised as residential, council/government owned land and undeveloped scrubland/ bushland between the mid-1800s and 1900's. From the mid-1900s onwards the school was developed. The site itself appeared to be impacted by construction and demolition of structures, use and impacts from hazardous building materials in these former structures, filling for levelling purposes and installation of services, and use of pesticides around site and beneath buildings. These also formed the AEC for the site. Based on the potential contamination sources/AEC identified, and the potential for contamination, further investigation of the contamination conditions was considered to be required via an intrusive investigation in order to quantify potential risks and facilitate estimates to clean up the site, should clean-up be required.
Preliminary (Intrusive) Site Investigation, 2023[7]	The intrusive PSI was undertaken in September 2023. The investigation included a review of existing project information, a site inspection, and soil sampling from five boreholes of which four are within the site applicable to the DSI (BH2, BH3, BH4 and BH5). Reference should be made to Figure 2 in Appendix A. The boreholes encountered fill materials (i.e. historically imported soil) to depths of approximately 0.4m below ground level (BGL) to 1.5mBGL, underlain by natural clayey alluvial soils. The fill contained inclusions of igneous and ironstone gravel and root fibres. Elevated concentrations of the CoPC were not encountered above the adopted Site Assessment Criteria (SAC) in the soil samples. The investigation did not identified contamination that would preclude the proposed development/use of the site and a trigger for remediation was not identified. However, a DSI was recommended to meet the requirements of NEPM 2023 and the NSW EPA guidelines, and assess whether remediation is required.

[6] JKE, (2023a). *Report to School Infrastructure New South Wales on Preliminary (Desktop) Site Investigation for Potential Additions to Ulladulla High School at 55 South Street, Ulladulla, NSW.* (Ref: E36217PTrpt Ulladulla HS) (referred to as Desktop)

[7] JKE, (2023a). *Report to School Infrastructure New South Wales on Preliminary (Intrusive) Site Investigation for Ulladulla High School Upgrades at 55 South Street, Ulladulla, NSW.* (Ref: E36217PTrpt3 DRAFT Ulladulla HS) (referred to as intrusive PSI)

3.2 Site Identification

Table 3-2: Site Identification

Site Address:	**55** South Street, Ulladulla, NSW
Lot & Deposited Plan:	Part of Lot 1 in DP595313
Current Land Use:	High school (Year 7 to year 12)
Proposed Land Use:	Continued use as a high school
Local Government Area:	Shoalhaven City Council
Current Zoning:	SP2: Educational Establishment
Site Area (m^2) (approx.):	1,035
RL (AHD in m) (approx.):	26-28
Geographical Location (decimal degrees) (approx.):	Latitude: -35.3588016 Longitude: 150.4688589
Site Plans:	Appendix A

3.3 Site Location and Regional Setting

The site is located within Ulladulla High School which is located in a mixed use (residential, commercial and infrastructure - education) area of Ulladulla and is bound by South Street to the south, St Vincent Street to the east, Green Street to the north, and Camden Street to the west. The site is located approximately 345m to the south of Millards Creek and approximately 485m to the west of Ulladulla harbour.

The site and wider school property is located within undulating topography defined by low relief hills generally sloping at approximately 5° to 10°. The site itself generally appearing to have been levelled to accommodate the existing development.

The most recent walkover inspection of the site was undertaken by JKE on 4 December 2024. The site formed part of the grass covered playing field in the central west area of the wider school property and two existing demountable classrooms in the south-east of the site (refer to Figure 1 and Figure 2 in Appendix A).

The site buildings were single storey demountable classrooms, constructed with metal walls and rooves, on brick piers. A concrete path extended along the southern side of the site. The remainder of the site generally comprised grass covered playground/ sports field.

Surface water would be expected to infiltrate the ground surface or flow in keeping with the local topography (i.e. flow to the north-east).

3.4 Surrounding Land Use

During the site inspection, JKE observed the following land uses in the immediate surrounds:

- North – Residential properties, Green Street and Ulladulla Public School, St Vincent De Paul retails shop and a Catholic Church;
- South – Residential properties;
- East – Residential properties and commercial properties (including Coles, Aldi, medical offices and other small retail businesses); and
- West – Residential properties.

JKE did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

3.5 Underground Services

The 'Before You Dig Australia' (BYDA) plans were reviewed in preparation of the SAQP in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

4 SUMMARY OF REGIONAL GEOLOGY, SOILS AND HYDROGEOLOGY

4.1 Regional Geology

Regional geological information was reviewed for the previous investigations. The information indicated that that the site is underlain by Quaternary aged deposits of unconsolidated alluvial gravel, sand, silt and clay with variable humic content; gravels commonly clast supported.

A summary of the subsurface conditions encountered during the intrusive PSI is presented in the following table:

Table 2-3: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all boreholes and extended to depths of approximately 0.4m to 1.5mBGL. The fill typically comprised silty clay with inclusions of igneous and ironstone gravel and root fibres. No odours or staining were recorded in the fill material during field work. No fibre cement fragments (FCF)/suspected asbestos containing material (ACM) was encountered in the fill material during fieldwork.
Natural Soil	Natural clayey soils were encountered beneath the fill material in all boreholes and extended to depths of approximately 0.8m to 4.0mBGL. No odours or staining were recorded in the natural soils during field work.
Bedrock	Siltstone or sandstone bedrock was encountered beneath the natural soils in all locations. No odours or staining were recorded in the bedrock during field work.
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling and a short time after.

4.2 Dryland Salinity – National Assessment

Dryland salinity information was reviewed for the previous investigation. There was no dryland salinity national assessment data for the site.

4.3 Acid Sulfate Soil (ASS) Risk and Planning

ASS risk maps were reviewed for the previous investigation. The information indicated that:

- According to the risk maps prepared by the Department of Land and Water Conservation (DLWC), the site is not located in an ASS risk area;
- Shoalhaven Local Environment Plan (LEP) 2014, indicated that the site is located within a Class 5 ASS risk area. Works in a Class 5 risk area that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent Class 1,2,3,4 land;

- The geological information indicates that the site is underlain by Quaternary aged alluvial gravel, sand, silt and clay. The borehole logs for the intrusive investigation indicate low plasticity sandy silty clay and medium to high plasticity silty clay residual soils, and sandstone bedrock; and
- The site is located at approximately 26m – 28m AHD. ASS materials are not usually associated with soil horizons above 5m AHD.

Based on the above, there is a relatively low potential for ASS materials to be disturbed during the activity described in Sections 1 and 2 of this report. It is the opinion of JKE that an intrusive investigation and/or an ASSMP is not considered necessary for the activity. The activity does not involve works that meet the Class 5 risk area triggers to prepare an ASSMP.

4.4 Hydrogeology

Hydrogeological information presented in the previous investigations indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes fractured or fissured, extensive aquifers of low to moderate productivity. There was a total of three registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 1,600m from the site. This was utilised for water supply purposes;
- All three bores were located over 1,600m cross-gradient to the north, of the site; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 2-3m, underlain by granite or sandstone bedrock. Standing water levels (SWLs) in the bores ranged from 18mBGL to 27mBGL.

The desktop information reviewed indicated that the subsurface conditions at the site are likely to consist of relatively high permeability (alluvial) soils. Although it is noted that the intrusive PSI identified residual soils overlying relatively shallow bedrock. There are no registered groundwater users in close proximity to the site. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur. Use of groundwater is not proposed as part of the activity.

Considering the local topography and surrounding land features, JKE anticipate groundwater to flow in a north-easterly direction.

4.5 Receiving Water Bodies

The upper reaches of an unnamed tributary runs in a south-west to north-east direction through the wider school property, to the east/north-east of the site. Millards Creek is located approximately 345m to the north of the site. Ulladulla Harbour is located approximately 485m to the east of the site. These water bodies are considered to be potential receptors.

5 REVIEW AND UPDATE OF CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and background/site history information. Reference should also be made to the figures attached in the appendices.

5.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) are presented in the following table:

Table 5-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – The site has been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. Fill can also be created from on-site earthworks and can become impacted via on-site activities such as demolition of buildings that contained hazardous building materials such as asbestos and lead paint. The intrusive PSI encountered fill to depths of 0.4m to 1.5mBGL on the site.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use of pesticides – Pesticides may have been used around the site and wider school property.	Heavy metals and OCPs.
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. Hazardous building materials may have also impacted the soils due to the demolition of former buildings/structures. These materials have also been identified within the existing buildings/structures on the wider school property site as per the asbestos register (as summarised in Section 3.1).	Asbestos, lead and PCBs.

5.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 5-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried infrastructure) is present, although this is considered to be the least likely mechanism for contamination.

Affected media	Soil has been identified as the potentially affected medium. The potential for groundwater impacts is considered to be relatively low. However, groundwater would need to be considered in the event significant contamination was identified in soil.
Receptor identification	Human receptors include site occupants/users (including adults and older children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users and (though, unlikely) recreational water users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including any proposed landscaped areas), freshwater ecology in the nearby creeks and marine ecology in Ulladulla Harbour.
Potential exposure pathways	Dermal absorption, ingestion and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary/direct contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings. Potential exposure pathways to groundwater (for human receptors) would be via vapour intrusion, or potential primary/secondary contact with groundwater during construction or if groundwater migrates into the creeks and harbour which could be utilised for recreational purposes. Exposure to ecological receptors could also occur in these water bodies.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into proposed buildings (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; • Contact with groundwater during construction activities; and • Migration of groundwater into nearby water bodies, including aquatic ecosystems and recreational water bodies.
Presence of preferential pathways for contaminant movement	None identified at the site.

6 SUMMARY OF SAMPLING, ANALYSIS AND QUALITY PLAN

JKE prepared a stand-alone SAQP for the DSI which is attached in the appendices (Appendix G). The SAQP is summarised as follows:

- Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 2.1;
- Soil samples were obtained from four boreholes (BH101 to BH104) as shown on the attached Figure 2 in Appendix A. The grid-based locations were placed on a 16m grid with locations selected to provide general site coverage taking into account the intrusive investigation locations; and
- Soil samples were obtained using a combination of hand tools and a mechanical excavator equipped with a pendulum auger (300mm diameter) on 2 and 4 December 2024.

6.1 Deviations to the SAQP

The planned location for BH104 was repositioned due to site access constraints associated with the existing demountable building. Reference should be made to Figure 2.

There were no other substantial deviations to the SAQP. Please refer to the SAQP attached in Appendix G for further information.

6.2 Laboratory Analysis

Samples were analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

Table 6-1: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, trip spikes and field rinsate samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	368222 and 368222-A
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	MFL0210

7 SITE ASSESSMENT CRITERIA (SAC)

The SAC were derived from the NEPM 2013 and other guidelines as discussed in the following sub-sections. The guideline values for individual contaminants are presented in the attached report tables and further explanation of the various criteria adopted is provided in the appendices.

7.1 Soil

Soil data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) as outlined below.

7.1.1 Human Health

- Health Investigation Levels (HILs) for a 'public open spaces; secondary schools; and footpaths' exposure scenario (HIL-C);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B) will be adopted as land use type C does not allow for buildings and structures. HSLs will be calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[8]; and
- Asbestos will be assessed against the HSL-C criteria. A summary of the asbestos criteria is provided in the table below:

Table 7-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-C criteria were adopted for the assessment of asbestos in soil. The SAC adopted for asbestos were derived from the NEPM 2013 and are based on the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[9]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.02% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): $$\text{\% w/w asbestos in soil} = \frac{\text{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$$ However, we are of the opinion that the actual soil volume in a 10L bucket varies considerably due to the presence of voids, particularly when assessing cohesive soils. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows (we note that the units have also converted to grams):

[8] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[9] Western Australian (WA) Department of Health (DoH), (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. (referred to as WA DoH 2021)

Guideline	Applicability
	% w/w asbestos in soil = $\frac{\text{**% asbestos content x bonded ACM (g)**}}{\text{Soil weight (g)}}$

7.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. These have only been applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[10];
- ESLs were adopted based on the soil type; and
- EILs for selected metals were calculated based on the most conservative added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[11]. This method is considered to be adequate for the Tier 1 screening.

7.1.3 Management Limits for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) were considered.

7.1.4 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[12] as outlined in the following table:

Table 7-2: 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; and • 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 must be undertaken to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.

[10] Canadian Council of Ministers of the Environment, (1999). *Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)* (referred to as the Canadian Soil Quality Guidelines)

[11] Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

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

Category	Description
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.

8 RESULTS

8.1 Summary of Data (QA/QC) Evaluation

The data evaluation is presented in the appendices. In summary, JKE is of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

8.2 Subsurface Conditions

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

Table 8-1: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all boreholes and extended to depths of approximately 0.1m to 0.6mBGL. The fill typically comprised silty clay or clayey sand with inclusions of igneous sandstone and ironstone cobbles, ironstone gravel, plastic fragments, sand, ash, roots and root fibres. No odours or staining were recorded in the fill material during field work. No fibre cement fragments (FCF)/suspected asbestos containing material (ACM) was encountered in the fill material during fieldwork.
Natural Soil	Natural clayey residual soils were encountered beneath the fill material in all boreholes and extended to the maximum termination depth of the investigation at 1.0mBGL. No odours or staining were recorded in the natural soils during fieldwork.
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling and a short time after.

8.3 Field Screening

A summary of the field screening results is presented in the following table:

Table 8-2: Summary of Field Screening

Aspect	Details
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. All results were 0ppm isobutylene equivalents which indicates a lack of PID detectable VOCs.
Bulk Screening for Asbestos	The bulk field screening results are summarised in the attached report Table S5. FCF/ACM was not encountered in any of the bulk field screening samples during fieldwork. All results were below the SAC.

8.4 Soil Laboratory Results

The soil laboratory results were assessed against the SAC presented in Section 7.1. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

8.4.1 Human Health and Environmental (Ecological) Assessment

Table 8-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	9	12	0	0	-
Cadmium	9	<0.4	0	NSL	-
Chromium (total)	9	17	0	0	-
Copper	9	13	0	0	-
Lead	9	11	0	0	-
Mercury	9	<0.1	0	NSL	-
Nickel	9	8	0	0	-
Zinc	9	55	0	0	-
Total PAHs	9	<0.05	0	NSL	-
Benzo(a)pyrene	9	<0.05	NSL	0	-
Carcinogenic PAHs (as BaP TEQ)	9	<0.5	0	NSL	-
Naphthalene	9	<1	0	NSL	-
DDT+DDE+DDD	5	<0.1	0	NSL	-
DDT	5	<0.1	NSL	0	-
Aldrin and dieldrin	5	<0.1	0	NSL	-
Chlordane	5	<0.1	0	NSL	-
Heptachlor	5	<0.1	0	NSL	-
Chlorpyrifos (OPP)	5	<0.1	0	NSL	-
PCBs	5	<0.1	0	NSL	-
TRH F1	9	<25	0	0	-

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
TRH F2	9	<50	0	0	-
TRH F3	9	100	0	0	-
TRH F4	9	<100	0	0	-
Benzene	9	<0.2	0	0	-
Toluene	9	<0.5	0	0	-
Ethylbenzene	9	<1	0	0	-
Xylenes	9	<3	0	0	-
Asbestos (in soil) (%w/w)	5	<0.01%w/w ACM <0.001%w/w AF/FA	0	NA	Asbestos was not detected in any of the soil samples analysed.

Notes:

N: Total number (primary samples)

NSL: No set limit

NL: Not limiting

8.4.2 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Section 7.1.4. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 8-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Arsenic	9	0	0	-
Cadmium	9	0	0	-
Chromium	9	0	0	-
Copper	9	0	0	-
Lead	9	0	0	-
Mercury	9	0	0	-
Nickel	9	0	0	-
Zinc	9	0	0	-
TRH (C_6-C_9)	9	0	0	-
TRH (C_{10}-C_{36})	9	0	0	-

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
BTEX	9	0	0	-
Total PAHs	9	0	0	-
Benzo(a)pyrene	9	0	0	-
OCPs & OPPs	5	0	0	-
PCBs	5	0	0	-
Asbestos	5	-	-	Asbestos was not detected in any of the soil samples analysed.

N: Total number (primary samples)

NSL: No set limit

9 WASTE CLASSIFICATION ASSESSMENT

9.1 Preliminary Waste Classification of Fill

Based on the results of the waste classification assessment, and at the time of reporting, the fill material at the site is given a preliminary classification of **General Solid Waste (non-putrescible)**. Additional testing should be undertaken during the activity to confirm the waste classification, prior to any off-site disposal of waste.

Waste fill should be disposed of to a facility that is appropriately licensed by the NSW EPA to receive the waste stream. The facility should be contacted to obtain the required approvals prior to commencement of excavation.

9.2 Classification of Natural Soil and Bedrock

Based on the scope of work undertaken for this assessment, and at the time of reporting, JKE is of the opinion that the natural soil and bedrock at the site meets the definition of **VENM** for off-site disposal or re-use purposes. VENM is considered suitable for re-use on-site (from a contamination viewpoint), or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material.

10 DISCUSSION

10.1 Tier 1 Risk Assessment and Review of CSM

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

10.1.1 Soil

Elevated concentrations of the other CoPC were not encountered in the soil samples analysed during the DSI.

No FCF was encountered in the fill material at the site during the field work. No asbestos was detected in any of the soil samples analysed. The fill did not appear to contain building/demolition waste which is often a pre-cursor for asbestos. However, we note that sampling was completed from boreholes using auger drilling methods (due to site accessibility limitations) which limits the disturbance of the soil and a thorough visual assessment of the fill. We have included recommendations to mitigate potential risks from unexpected finds.

10.1.2 Consideration of PSI Soil Data

Elevated concentrations of the CoPC were not encountered in the soil samples analysed during the intrusive PSI. Consideration of the intrusive investigation data set is further discussed in the intrusive PSI report.

10.1.3 Groundwater

Based on the site history, a lack of potential groundwater contamination sources in the area, and the soil results reported for the intrusive PSI and DSI, the potential for groundwater contamination to have resulted from on-site or nearby off-site activities is considered to be low.

10.2 Decision Statements

The decision statements are addressed below:

Are any results above the SAC?

No.

Do potential risks associated with contamination exist, and if so, what are they?

Actual risks were not identified and the potential for contamination risks associated with historical land uses is considered to be low in light of the intrusive PSI and DSI findings. Recommendations have been included to mitigate risks from unexpected finds.

Is remediation required?

The DSI did not identify a trigger for remediation and confirmed that there is a low potential for contamination due to historical activities. Further characterisation is not considered to be required provided potential risks are managed via the development and implementation of a robust unexpected finds protocol.

Is the site suitable for the proposed activity, or can the site be made suitable subject to further characterisation and/or remediation?

JKE is of the opinion that the site is suitable for the proposed activity as described in Section 1.2. The site can remain suitable subject to the development and implementation of a robust unexpected finds protocol (UFP) during site works associated with the activity.

10.3 Review of CSM and Data Gaps

An assessment of data gaps is provided in the following table:

Table 10-1: Review of CSM and Data Gap Assessment

Data Gap	Assessment
Fill material	Fill ranging in depth between approximately 0.1mBGL and 0.6mBGL was encountered across the site. The fill contained inclusions such as igneous sandstone and ironstone cobbles, ironstone gravel, sand, and ash. Anthropogenic inclusions were largely absent. Based on the site history, field work observations and soil results reported, risks associated with this AEC are considered to be low and do not require further assessment. A UFP has been recommended to manage any unexpected finds.
Use of pesticides	Based on the reported results to date, and at the time of reporting, risks associated with this AEC are considered to be low and do not require further assessment. Pesticides were not detected in the soil samples collected from the site.
Hazardous Building Materials	Based on the site history, field work observations and soil results reported to, risks associated with this AEC are considered to be low and do not require further assessment. A UFP has been recommended to manage any unexpected finds.

11 CONCLUSIONS AND RECOMMENDATIONS

The DSI included a review of existing reports, a site inspection and soil sampling from four boreholes drilled with hand tools or a large diameter (300mm) pendulum auger attachment on an excavator. The following potential contamination sources/AEC were identified: fill material; use of pesticides; and hazardous building materials.

The boreholes generally encountered fill material to depths of between 0.1m to 0.6mBGL, underlain by residual clayey and sandy soils to the maximum termination depth of the investigation at 1.0mBGL. The fill contained inclusions of igneous sandstone and ironstone cobbles, ironstone gravel, sand, ash, roots and root fibres. Minor traces of plastic were found in a few locations. A selection of soil samples was analysed for the CoPC identified in the CSM. Elevated concentrations of the CoPC were not encountered above the adopted SAC.

Based on the Tier 1 risk assessment, JKE is of the opinion that potential risks associated with the CoPC at the site are low and the data collected during the investigations were assessed to pose a low risk to the receptors. Unacceptable risks, warranting remediation, were not identified

Further investigation and/or remediation is not considered to be required and the site is considered to be suitable for the proposed activity outlined in Section 1.2, from a contamination viewpoint. We recommend that a robust UFP be prepared by a suitably qualified environmental consultant and that this protocol be implemented during the development/construction phase of the project.

Preliminary waste classifications are discussed in Section 9. In JKE's opinion, all fill will classify as 'General Solid Waste (non-putrescible)'. Confirmatory waste classification assessment is required prior to off-site disposal of any waste as final waste classification documentation, including the waste volume, will need to be provided to the receiving facility.

JKE consider that the report objectives outlined in Section 2.1 have been addressed.

11.1 Mitigation Measures – REF Requirement

JKE was requested by the client to include a table to support the contamination-related risk mitigation measures to be included in the REF. Mitigation measures to avoid, minimise, rectify and/or reduce or eliminate over time the adverse environmental impacts identified in the DSI are outlined in the table below:

Table 11-1: Mitigation Measures Relating to DSI Findings

Aspect / Section	Mitigation Measure	Reason for Mitigation Measure
During development/ construction	Confirmatory Waste Classification.	Additional testing should be undertaken during the activity to confirm the waste classification, prior to any off-site disposal of waste.

Aspect / Section	Mitigation Measure	Reason for Mitigation Measure
During development/ construction	Preparation of an Unexpected Finds Protocol	Due to the potential occurrence of unexpected finds in ground, we recommend that a robust unexpected finds protocol be prepared by a suitably qualified environmental consultant[13] and that this protocol be implemented during the development/construction phase of the project.

11.2 Evaluation of Environmental Impacts – REF Requirement

It is considered that the environmental impacts as identified in the DSI can be adequately mitigated through the above recommend measures.

Further investigation and/or remediation is not considered to be required and the site is considered to be suitable for the activity outlined in Section 2, from a contamination viewpoint.

[13] 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

12 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;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- 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 assessment 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; and
- 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.

Important Information About This Report

These notes have been prepared by JKE to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors
This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the investigation. If the subject site is sold, ownership of the investigation report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the investigation was undertaken. No person should apply an investigation for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an investigation report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data
Site investigations identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an investigation indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Investigation Limitations
Although information provided by a site investigation can reduce exposure to the risk of the presence of contamination, no environmental site investigation can eliminate the risk. Even a rigorous professional investigation may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Investigations by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an investigation report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Investigation Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the investigation. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the investigation. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete investigation should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site investigation is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site investigation, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

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**

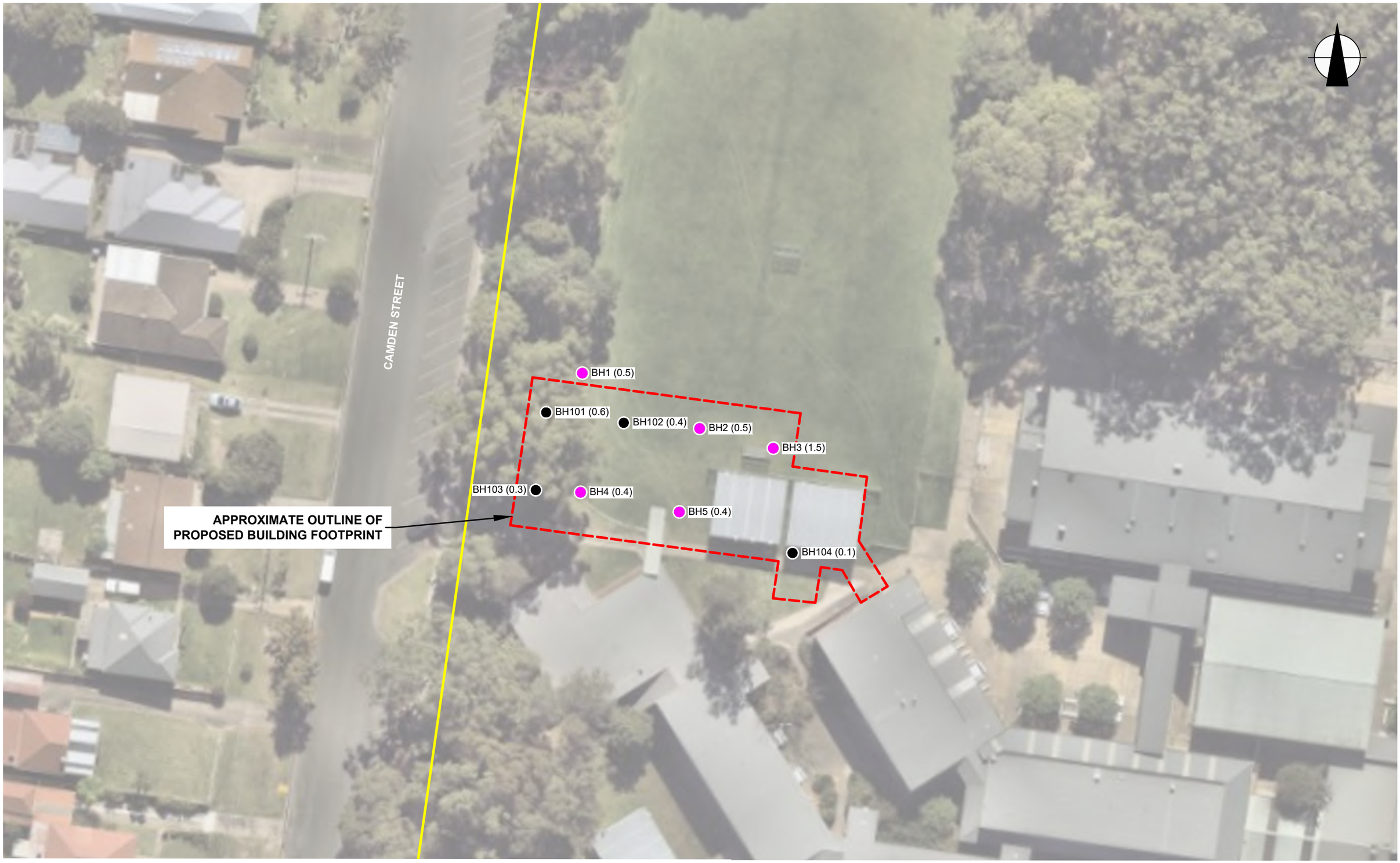
Location: 55 SOUTH STREET, ULLADULLA, NSW

Project No: E36217PTrpt5-DSI

Figure No: 1

JKEnvironments

PLOT DATE: 23/12/2024 11:46:23 AM DWG FILE: K:\SC EIS JOBS\36000'S\E36217PT ULLADULLA HSVCAD\E36217PTRPT5-DSI.DWG



LEGEND

	APPROXIMATE SITE BOUNDARY
	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH101	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI, 2024)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 5 10 15 20 25

SCALE 1:500 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: 55 SOUTH STREET, ULLADULLA, NSW

Project No: E36217PTrpt5-DSI

Figure No: 2

JKEnvironments

DWG FILE: K:\5C EIS JOBS\36000\SIE36217PT ULLADULLA HS\CADIE36217PTRPT5-DSI.DWG

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Appendix B: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
ADWG:	AustralianDrinking Water Guidelines
AF:	Asbestos Fines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CEC:	Cation Exchange Capacity
CRC:	Cooperative Research Centre
CT:	Contaminant Threshold
EILs:	Ecological Investigation Levels
ESLs:	Ecological Screening Levels
FA:	Fibrous Asbestos
GIL:	Groundwater Investigation Levels
GSW:	General Solid Waste
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
kg/L	kilograms per litre
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
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
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
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
RS:	Rinsate Sample
RSL:	Regional Screening Levels
RSW:	Restricted Solid Waste
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

Table Specific Explanations:

HIL Tables:

- The chromium results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- Carcinogenic PAHs is a toxicity weighted sum of analyte concentrations for a specific list of PAH compounds relative to B(a)P. It is also refered to as the B(a)P Toxic Equivalence Quotient (TEQ).
- Statistical calculations are undertaken using ProUCL (USEPA). Statistical calculation is usually undertaken using data from fill samples.

EIL/ESL Table:

- ABC Values for selected metals have been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with low traffic have been quoted).

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, Endrin Aldehyde.

QA/QC Table:

- Field blank, Inter and Intra laboratory duplicate results are reported in mg/kg.
- Trip spike results are reported as percentage recovery.
- Field rinsate results are reported in µg/L.

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-C: 'Public open space; secondary schools; and footpaths'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH101	0-0.1	F: Silty Clay	**4**	<0.4	**8**	**8**	**9**	<0.1	**7**	**35**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	**5**	<0.4	**12**	**13**	**11**	<0.1	**8**	**55**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH101 - [TRIPLICATE]	0-0.1	F: Silty Clay	**4**	<0.4	**9**	**10**	**10**	<0.1	**8**	**47**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH101	0.4-0.5	F: Silty Clay	**12**	<0.4	**17**	**2**	**7**	<0.1	<1	**4**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH101	0.9-1	Silty Clay	<4	<0.4	**11**	**3**	**3**	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH102	0-0.1	F: Silty Clay	**4**	<0.4	**8**	**8**	**10**	<0.1	**6**	**36**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH102	0.8-0.9	Silty Clay	<4	<0.4	**12**	<1	**7**	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	0-0.1	F: Silty Clay	<4	<0.4	**7**	**6**	**8**	<0.1	**2**	**17**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH103	0.5-0.6	Silty Clay	<4	<0.4	**5**	**2**	**4**	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH104	0-0.1	F: Clayey Sand	<4	<0.4	**4**	**3**	**5**	<0.1	**2**	**16**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH104	0.5-0.6	Silty Clay	<4	<0.4	**11**	**2**	**3**	<0.1	<1	**2**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP101	BH101 (0-0.1m)	F: Silty Clay	**4**	<0.4	**8**	**10**	**11**	<0.1	**7**	**43**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP102	BH103(0-0.1m)	F: Silty Clay	<4	<0.4	**7.5**	**6.3**	**7.3**	<0.1	**2.5**	**19**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
Total Number of Samples			13	13	13	13	13	13	13	13	12	12	8	8	8	8	8	8	8	8	8	5
Maximum Value			12	<PQL	17	13	11	<PQL	8	55	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Not Detected

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
Asbestos Detected **Detected**

TABLE S2
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH101	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH101	0.4-0.5	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH101	0.9-1	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH102	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH102	0.8-0.9	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH103	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH103	0.5-0.6	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH104	0-0.1	F: Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH104	0.5-0.6	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP101	BH101 (0-0.1m)	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP102	BH103(0-0.1m)	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	-
Total Number of Samples					12	12	12	12	12	12	12	10
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.1

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the concentration above the SAC is highlighted in grey in the Site Assessment Criteria Table below

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH101	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101	0.4-0.5	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101	0.9-1	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0.8-0.9	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0.5-0.6	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	0-0.1	F: Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	0.5-0.6	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP101	BH101 (0-0.1m)	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP102	BH103(0-0.1m)	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3

TABLE S3
SOIL LABORATORY RESULTS COMPARED TO MANAGEMENT LIMITS
All data in mg/kg unless stated otherwise

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH101	0-0.1	Fine	<25	<50	<100	<100
BH101 - [LAB_DUP]	0-0.1	Fine	<25	<50	<100	<100
BH101	0.4-0.5	Fine	<25	<50	<100	<100
BH101	0.9-1	Fine	<25	<50	<100	<100
BH102	0-0.1	Fine	<25	<50	<100	<100
BH102	0.8-0.9	Fine	<25	<50	<100	<100
BH103	0-0.1	Fine	<25	<50	<100	<100
BH103	0.5-0.6	Fine	<25	<50	<100	<100
BH104	0-0.1	Fine	<25	<50	<100	<100
BH104	0.5-0.6	Fine	<25	<50	<100	<100
SDUP101	BH101 (0-0.1m)	Fine	<25	<50	**100**	<100
SDUP102	BH103(0-0.1m)	Fine	<25	<50	<50	<100
Total Number of Samples			12	12	12	12
Maximum Value			<PQL	<PQL	100	<PQL

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH101	0-0.1	Fine	800	1000	3500	10000
BH101 - [LAB_DUP]	0-0.1	Fine	800	1000	3500	10000
BH101	0.4-0.5	Fine	800	1000	3500	10000
BH101	0.9-1	Fine	800	1000	3500	10000
BH102	0-0.1	Fine	800	1000	3500	10000
BH102	0.8-0.9	Fine	800	1000	3500	10000
BH103	0-0.1	Fine	800	1000	3500	10000
BH103	0.5-0.6	Fine	800	1000	3500	10000
BH104	0-0.1	Fine	800	1000	3500	10000
BH104	0.5-0.6	Fine	800	1000	3500	10000
SDUP101	BH101 (0-0.1m)	Fine	800	1000	3500	10000
SDUP102	BH103(0-0.1m)	Fine	800	1000	3500	10000

TABLE S4
SOIL LABORATORY RESULTS COMPARED T0 DIRECT CONTACT CRITERIA
All data in mg/kg unless stated otherwise

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		82,000	62,000	85,000	120,000	1,100	120,000	85,000	130,000	29,000	
Site Use		**Intrusive Maintenance Worker - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH101	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH101 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH101	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH101	0.9-1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH102	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH102	0.8-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH103	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH103	0.5-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH104	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH104	0.5-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP101	BH101 (0-0.1m)	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<1	-
SDUP102	BH103(0-0.1m)	<25	<50	<50	<100	<0.2	<0.5	<1	<3	<1	-
Total Number of Samples		12	12	12	12	12	12	12	12	12	10
Maximum Value		<PQL	<PQL	100	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.1

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

TABLE S5
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-C:Public open space; secondary schools; and footpaths

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.02**			**0.001**			**0.001**											**0.02**	**0.001**
4/12/2024	BH101	0-0.2	No	10	11,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	368222	BH101	0-0.1	617.54	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/12/2024	BH101	0.2-0.6	No	10	12,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	368222	BH101	0.4-0.5	691.19	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/12/2024	BH102	0-0.1	No	10	10,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	368222	BH102	0-0.1	523.51	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/12/2024	BH102	0.1-0.4	No	10	11,110	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/12/2024	BH103	0-0.1	No	10	10,410	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	368222	BH103	0-0.1	658.65	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/12/2024	BH103	0.1-0.3	No	10	11,210	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/12/2024	BH104	0-0.1	No	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	368222	BH104	0-0.1	716.18	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001

Concentration above the SAC **VALUE**

TABLE S6
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																	
							AGED HEAVY METALS-EILs						EILs		ESLs						
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH101	0-0.1	F: Silty Clay	Fine	NA	NA	NA	**4**	**8**	**8**	**9**	**7**	**35**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	Fine	NA	NA	NA	**5**	**12**	**13**	**11**	**8**	**55**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101 - [TRIPLICATE]	0-0.1	F: Silty Clay	Fine	NA	NA	NA	**4**	**9**	**10**	**10**	**8**	**47**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH101	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	**12**	**17**	**2**	**7**	<1	**4**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101	0.9-1	Silty Clay	Fine	NA	NA	NA	<4	**11**	**3**	**3**	<1	<1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0-0.1	F: Silty Clay	Fine	NA	NA	NA	**4**	**8**	**8**	**10**	**6**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0.8-0.9	Silty Clay	Fine	NA	NA	NA	<4	**12**	<1	**7**	<1	<1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH103	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**7**	**6**	**8**	**2**	**17**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH103	0.5-0.6	Silty Clay	Fine	NA	NA	NA	<4	**5**	**2**	**4**	<1	<1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH104	0-0.1	F: Clayey Sand	Fine	NA	NA	NA	<4	**4**	**3**	**5**	**2**	**16**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH104	0.5-0.6	Silty Clay	Fine	NA	NA	NA	<4	**11**	**2**	**3**	<1	**2**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP101	BH101 (0-0.1m)	F: Silty Clay	Fine	NA	NA	NA	**4**	**8**	**10**	**11**	**7**	**43**	<1	<0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<0.05
SDUP102	BH103(0-0.1m)	F: Silty Clay	Fine	NA	NA	NA	<4	**7.5**	**6.3**	**7.3**	**2.5**	**19**	<1	<0.1	<25	<50	<50	<100	<0.2	<0.5	<1	<3	<0.05
Total Number of Samples				0	0	0	13	13	13	13	13	13	12	8	12	12	12	12	12	12	12	12	12
Maximum Value				NA	NA	NA	12	17	13	11	8	55	<PQL	<PQL	<PQL	<PQL	100	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH101	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH101 - [TRIPLICATE]	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	--	--	--	--	--	--	--	--	--	--	--
BH101	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH101	0.9-1	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH102	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH102	0.8-0.9	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH103	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH103	0.5-0.6	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH104	0-0.1	F: Clayey Sand	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH104	0.5-0.6	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
SDUP101	BH101 (0-0.1m)	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
SDUP102	BH103(0-0.1m)	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20

TABLE S7
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**																									
BH101	0-0.1	F: Silty Clay	**4**	<0.4	**8**	**8**	**9**	<0.1	**7**	**35**	<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
BH101 - [LAB_DUP]	0-0.1	F: Silty Clay	**5**	<0.4	**12**	**13**	**11**	<0.1	**8**	**55**	<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
BH101 - [TRIPLICATE]	0-0.1	F: Silty Clay	**4**	<0.4	**9**	**10**	**10**	<0.1	**8**	**47**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH101	0.4-0.5	F: Silty Clay	**12**	<0.4	**17**	**2**	**7**	<0.1	<1	**4**	<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
BH101	0.9-1	Silty Clay	<4	<0.4	**11**	**3**	**3**	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH102	0-0.1	F: Silty Clay	**4**	<0.4	**8**	**8**	**10**	<0.1	**6**	**36**	<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
BH102	0.8-0.9	Silty Clay	<4	<0.4	**12**	<1	**7**	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH103	0-0.1	F: Silty Clay	<4	<0.4	**7**	**6**	**8**	<0.1	**2**	**17**	<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
BH103	0.5-0.6	Silty Clay	<4	<0.4	**5**	**2**	**4**	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH104	0-0.1	F: Clayey Sand	<4	<0.4	**4**	**3**	**5**	<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
BH104	0.5-0.6	Silty Clay	<4	<0.4	**11**	**2**	**3**	<0.1	<1	**2**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP101	BH101 (0-0.1m)	F: Silty Clay	**4**	<0.4	**8**	**10**	**11**	<0.1	**7**	**43**	<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
SDUP102	BH103(0-0.1m)	F: Silty Clay	<4	<0.4	**7.5**	**6.3**	**7.3**	<0.1	**2.5**	**19**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
Total Number of Samples			13	13	13	13	13	13	13	13	12	12	8	8	8	8	8	12	12	12	12	12	12	12	12	12	5
Maximum Value			12	<PQL	17	13	11	<PQL	8	55	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Not Detected

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**
Concentration above PQL — **Bold**
Asbestos Detected > Special Waste (asbestos) — **Detected**

JKEnvironments

TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.05*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH101	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP101	BH101 (0-0.	<25	<50	100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	75	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	67%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH103	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP102	BH103(0-0.	<25	<50	<50	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB101	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
Blank	4/12/24																									
Field	FR101-Shove	µg/L	56	<50	<50	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
Rinsate	4/12/24																									
Trip	TS101		-	-	-	-	92%	112%	92%	92%	89%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	4/12/24																									

			HCB	alpha- BHC	gamma- BHC	beta- BHC	Heptachlor	delta- BHC	Aldrin	Heptachlor Epoxide	Gamma- Chlordane	alpha- chlordane	Endosulfan I	pp- DDE	Dieldrin	Endrin	pp- DDD	Endosulfan II	pp- DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH101	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP101	BH101 (0-0.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH103	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP102	BH103(0-0.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blank	4/12/24																					
Field	FR101-Shove	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinsate	4/12/24																					
Trip	TS101		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	4/12/24																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4.0*	*0.4*	*1.0*	*1.0*	*1.0*	*0.1*	*1.0*	*1.0*
Intra	BH101	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	8	8	9	<0.1	7	35
laboratory	SDUP101	BH101 (0-0.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	8	10	11	<0.1	7	43
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	4	nc	8	9	10	nc	7	39
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	nc	0%	22%	20%	nc	0%	21%
Inter	BH103	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	7	6	8	<0.1	2	17
laboratory	SDUP102	BH103(0-0.	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	7.5	6.3	7.3	<0.1	2.5	19
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	7.25	6.15	7.65	nc	2.25	18
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	7%	5%	9%	nc	22%	11%
Field	TB101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	<0.4	<1	<1	<1	<0.1	<1	<1
Blank	4/12/24																						
Field	FR101-Shove	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.01	<0.01	0.2	<0.03	<0.0005	<0.02	<0.02
Rinsate	4/12/24																						
Trip	TS101		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	4/12/24																						

Result outside of QA/QC acceptance criteria

Rinsate metals results in mg/L

Appendix C: Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH101 1/1

SDUP101: 0-0.1m

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED UPGRADES

Location: 55 SOUTH STREET, ULLADULLA, NSW

Job No.: E36217PT **Method:** PENDULUM AUGER **R.L. Surface:** N/A

Date: 4/12/24 **Datum:** -

Plant Type: EXCAVATOR **Logged/Checked by:** O.B./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous and sandstone gravel, sand, ash, roots and root fibres.	w≈PL			GRASS COVER
										FILL: Silty clay, low to medium plasticity, brown mottled grey, trace of ironstone cobbles, igneous and ironstone gravel, sand and root fibres.	w<PL			SCREEN: 11.90kg, 0-0.2m, NO FCF SCREEN: 12.20kg, 0.2-0.6m, NO FCF
							0.5		CI-CH	Silty CLAY: medium to high plasticity, light grey mottled red brown, trace of ironstone gravel.	w<PL			RESIDUAL
							1			END OF BOREHOLE AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH102** **1/1**

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED UPGRADES

Location: 55 SOUTH STREET, ULLADULLA, NSW

Job No.: E36217PT **Method:** PENDULUM AUGER **R.L. Surface:** N/A

Date: 4/12/24 **Datum:** -

Plant Type: EXCAVATOR **Logged/Checked by:** O.B./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous and ironstone gravel, sand, roots and root fibres.	w≈PL			GRASS COVER SCREEN: 10.9kg, 0-0.1m, NO FCF SCREEN: 11.11kg, 0.1-0.4m, NO FCF
							0.5		CI-CH	Silty CLAY: medium to high plasticity, light grey mottled red brown, trace of ironstone gravel.	w<PL			RESIDUAL
							1			END OF BOREHOLE AT 0.9m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH103 1/1

SUP102: 0-0.1m

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED UPGRADES

Location: 55 SOUTH STREET, ULLADULLA, NSW

Job No.: E36217PT **Method:** PENDULUM AUGER **R.L. Surface:** N/A

Date: 4/12/24 **Datum:** -

Plant Type: EXCAVATOR **Logged/Checked by:** O.B./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous and ironstone gravel, sand, roots and root fibres.	w<PL			GRASS COVER SCREEN: 10.41kg, 0-0.1m, NO FCF
							0.5		CI-CH	Silty CLAY: medium plasticity, light grey mottled red brown, trace of ironstone gravel.	w<PL			SCREEN: 11.21kg, 0.1-0.3m, NO FCF RESIDUAL
										END OF BOREHOLE AT 0.7m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH104** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED UPGRADES

Location: 55 SOUTH STREET, ULLADULLA, NSW

Job No.: E36217PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 2/12/24 **Datum:** -

Plant Type: - **Logged/Checked by:** O.B./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Clayey sand, fine to medium grained, brown, trace of plastic fragments, roots and root fibres.	D			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, light grey mottled orange brown, brown and red brown.	w≈PL			SCREEN: 10.10kg, 0-0.1m, NO FCF RESIDUAL
	■		■				0.5							
										END OF BOREHOLE AT 0.6m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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:

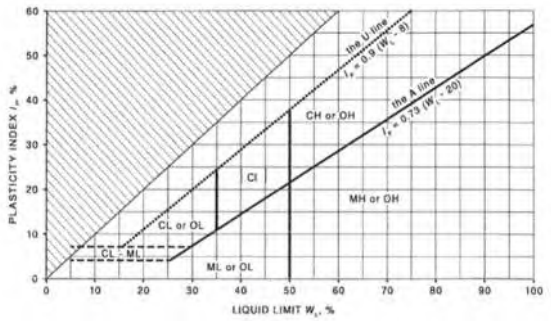
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.

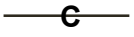
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

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 Report(s) & COC Documents

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CERTIFICATE OF ANALYSIS 368222

Client Details

Client	JK Environments
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36217PT Ulladulla**
Number of Samples	12 Soil, 1 Water
Date samples received	05/12/2024
Date completed instructions received	05/12/2024

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	12/12/2024
Date of Issue	11/12/2024

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Authorised by Asbestos Approved Signatory: Lucy Zhu

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Loren Bardwell, Development Chemist
Lucy Zhu, Asbestos Supervisor
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH 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	%	112	78	89	110	111

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		368222-10	368222-12	368222-13
Your Reference	UNITS	SDUP101	TB101	TS101
Depth		-	-	-
Date Sampled		4/12/2024	4/12/2024	4/12/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	92%
Toluene	mg/kg	<0.5	<0.5	112%
Ethylbenzene	mg/kg	<1	<1	92%
m+p-xylene	mg/kg	<2	<2	92%
o-Xylene	mg/kg	<1	<1	89%
Naphthalene	mg/kg	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	116	110	95

svTRH (C10-C40) in Soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	07/12/2024	07/12/2024	07/12/2024	07/12/2024	07/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	80	80	81	82	80

svTRH (C10-C40) in Soil			
Our Reference		368222-10	368222-12
Your Reference	UNITS	SDUP101	TB101
Depth		-	-
Date Sampled		4/12/2024	4/12/2024
Type of sample		Soil	Soil
Date extracted	-	06/12/2024	06/12/2024
Date analysed	-	07/12/2024	07/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	100	<50
Surrogate o-Terphenyl	%	82	84

PAHs in Soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	103	103	105	104	102

PAHs in Soil			
Our Reference		368222-10	368222-12
Your Reference	UNITS	SDUP101	TB101
Depth		-	-
Date Sampled		4/12/2024	4/12/2024
Type of sample		Soil	Soil
Date extracted	-	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	103	102

Organochlorine Pesticides in soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
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
Mirex	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
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	101	102	104	104	102

Organochlorine Pesticides in soil		
Our Reference		368222-10
Your Reference	UNITS	SDUP101
Depth		-
Date Sampled		4/12/2024
Type of sample		Soil
Date extracted	-	06/12/2024
Date analysed	-	09/12/2024
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
Mirex	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1
Surrogate 4-Chloro-3-NBTF	%	102

Organophosphorus Pesticides in Soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	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
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-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
Fenthion	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
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	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
Phosalone	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
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	101	102	104	104	102

Organophosphorus Pesticides in Soil		
Our Reference		368222-10
Your Reference	UNITS	SDUP101
Depth		-
Date Sampled		4/12/2024
Type of sample		Soil
Date extracted	-	06/12/2024
Date analysed	-	09/12/2024
Dichlorvos	mg/kg	<0.1
Mevinphos	mg/kg	<0.1
Phorate	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Disulfoton	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Parathion-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
Fenthion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Methidathion	mg/kg	<0.1
Fenamiphos	mg/kg	<0.1
Ethion	mg/kg	<0.1
Phosalone	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Coumaphos	mg/kg	<0.1
Surrogate 4-Chloro-3-NBTF	%	102

PCBs in Soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
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 2-Fluorobiphenyl	%	96	95	97	96	95

PCBs in Soil		
Our Reference		368222-10
Your Reference	UNITS	SDUP101
Depth		-
Date Sampled		4/12/2024
Type of sample		Soil
Date extracted	-	06/12/2024
Date analysed	-	09/12/2024
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 2-Fluorobiphenyl	%	96

Acid Extractable metals in soil						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Arsenic	mg/kg	4	12	4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	17	8	7	4
Copper	mg/kg	8	2	8	6	3
Lead	mg/kg	9	7	10	8	5
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	7	<1	6	2	2
Zinc	mg/kg	35	4	36	17	16

Acid Extractable metals in soil				
Our Reference		368222-10	368222-12	368222-14
Your Reference	UNITS	SDUP101	TB101	BH101 - [TRIPLICATE]
Depth		-	-	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	06/12/2024	06/12/2024	06/12/2024
Arsenic	mg/kg	4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	8	<1	9
Copper	mg/kg	10	<1	10
Lead	mg/kg	11	<1	10
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	7	<1	8
Zinc	mg/kg	43	<1	47

Moisture						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	06/12/2024	06/12/2024	06/12/2024	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024	09/12/2024	09/12/2024	09/12/2024
Moisture	%	16	14	21	16	12

Moisture			
Our Reference		368222-10	368222-12
Your Reference	UNITS	SDUP101	TB101
Depth		-	-
Date Sampled		4/12/2024	4/12/2024
Type of sample		Soil	Soil
Date prepared	-	06/12/2024	06/12/2024
Date analysed	-	09/12/2024	09/12/2024
Moisture	%	20	0.3

Asbestos ID - soils NEPM - ASB-001						
Our Reference		368222-1	368222-2	368222-4	368222-6	368222-8
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH104
Depth		0-0.1	0.4-0.5	0-0.1	0-0.1	0-0.1
Date Sampled		4/12/2024	4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	11/12/2024	11/12/2024	11/12/2024	11/12/2024	11/12/2024
Sample mass tested	g	617.54	691.19	523.51	658.65	716.18
Sample Description	-	Brown coarse-grained soil & rocks	Brown clayey soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001
Asbestos comments	-	Nil	Nil	Nil	Nil	Nil

vTRH(C6-C10)/BTEXN in Water		
Our Reference		368222-11
Your Reference	UNITS	FR101-Shovel
Depth		-
Date Sampled		4/12/2024
Type of sample		Water
Date extracted	-	06/12/2024
Date analysed	-	09/12/2024
TRH C_6 - C_9	µg/L	55
TRH C_6 - C_{10}	µg/L	56
TRH C_6 - C_{10} less BTEX (F1)	µg/L	56
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	106
Surrogate Toluene-d8	%	103
Surrogate 4-Bromofluorobenzene	%	96

svTRH (C10-C40) in Water		
Our Reference		368222-11
Your Reference	UNITS	FR101-Shovel
Depth		-
Date Sampled		4/12/2024
Type of sample		Water
Date extracted	-	06/12/2024
Date analysed	-	06/12/2024
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	<50
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	<50
Surrogate o-Terphenyl	%	94

PAHs in Water		
Our Reference		368222-11
Your Reference	UNITS	FR101-Shovel
Depth		-
Date Sampled		4/12/2024
Type of sample		Water
Date extracted	-	06/12/2024
Date analysed	-	09/12/2024
Naphthalene	µg/L	<0.1
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	<0.1
Fluorene	µg/L	<0.1
Phenanthrene	µg/L	<0.1
Anthracene	µg/L	<0.1
Fluoranthene	µg/L	<0.1
Pyrene	µg/L	<0.1
Benzo(a)anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2
Benzo(a)pyrene	µg/L	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5
Total +ve PAH's	µg/L	<0.1
Surrogate p-Terphenyl-d14	%	87

Metals in Waters - Acid extractable		
Our Reference		368222-11
Your Reference	UNITS	FR101-Shovel
Depth		-
Date Sampled		4/12/2024
Type of sample		Water
Date prepared	-	06/12/2024
Date analysed	-	06/12/2024
Arsenic - Total	mg/L	<0.05
Cadmium - Total	mg/L	<0.01
Chromium - Total	mg/L	<0.01
Copper - Total	mg/L	0.2
Lead - Total	mg/L	<0.03
Mercury - Total	mg/L	<0.0005
Nickel - Total	mg/L	<0.02
Zinc - Total	mg/L	<0.02

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.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. NOTE#1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF relative to the sample mass tested) NOTE#2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-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.

Method ID	Methodology Summary
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. 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-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
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	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			09/12/2024	1	09/12/2024	09/12/2024		09/12/2024	09/12/2024
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	89	108
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	89	108
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	88	118
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	86	113
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	94	110
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	89	100
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	89	105
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	96	1	112	95	16	79	98

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			07/12/2024	1	07/12/2024	07/12/2024		07/12/2024	07/12/2024
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	105
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	99	109
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	100	82
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	102	105
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	99	109
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	100	82
Surrogate o-Terphenyl	%		Org-020	83	1	80	81	1	85	84

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			09/12/2024	1	09/12/2024	09/12/2024		09/12/2024	09/12/2024
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	102
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	108	108
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	106
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	104
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	112	104
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	112
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	106	104
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	104	100
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	101	1	103	104	1	101	101

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			09/12/2024	1	09/12/2024	09/12/2024		09/12/2024	09/12/2024
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	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	108	106
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	102	100
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	110	110
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	118
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	104	106
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	126	126
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	114
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	116	118
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	96	96
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	102	1	101	101	0	101	105

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			09/12/2024	1	09/12/2024	09/12/2024		09/12/2024	09/12/2024
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	128	128
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
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]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion-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	106	108
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	128	134
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	126	136
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	110	112
Fenthion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	132
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<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	130	136
Phosalone	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	102	1	101	101	0	101	105

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date extracted	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			09/12/2024	1	09/12/2024	09/12/2024		09/12/2024	09/12/2024
Aroclor 1016	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	111	100
Aroclor 1260	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	96	1	96	94	2	95	97

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	368222-2
Date prepared	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Date analysed	-			06/12/2024	1	06/12/2024	06/12/2024		06/12/2024	06/12/2024
Arsenic	mg/kg	4	Metals-020	<4	1	4	5	22	117	101
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	96
Chromium	mg/kg	1	Metals-020	<1	1	8	12	40	107	97
Copper	mg/kg	1	Metals-020	<1	1	8	13	48	102	99
Lead	mg/kg	1	Metals-020	<1	1	9	11	20	107	102
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	92	111
Nickel	mg/kg	1	Metals-020	<1	1	7	8	13	106	100
Zinc	mg/kg	1	Metals-020	<1	1	35	55	44	106	100

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
Date analysed	-			09/12/2024	[NT]	[NT]	[NT]	[NT]	09/12/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	93	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	105	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate Toluene-d8	%		Org-023	102	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	98	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
Date analysed	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	113	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	116	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	113	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	116	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	90	[NT]	[NT]	[NT]	[NT]	123	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
Date analysed	-			09/12/2024	[NT]	[NT]	[NT]	[NT]	09/12/2024	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	75	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	65	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	105	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
Date analysed	-			06/12/2024	[NT]	[NT]	[NT]	[NT]	06/12/2024	[NT]
Arsenic - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	111	[NT]
Cadmium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chromium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	100	[NT]
Lead - Total	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	105	[NT]
Mercury - Total	mg/L	0.0005	Metals-021	<0.0005	[NT]	[NT]	[NT]	[NT]	115	[NT]
Nickel - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	104	[NT]
Zinc - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	105	[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 368222-1 for Cu and Zn. Therefore a triplicate result has been issued as laboratory sample number 368222-14.

vTRH & BTEXN in Water NEPM - TRH C6-C9/C6-C10 Results are positive (or in part positive) due to the presence of THMs within the sample.

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

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	Katrina Taylor

Sample Login Details

Your reference	E36217PT Ulladulla
Envirolab Reference	368222
Date Sample Received	05/12/2024
Date Instructions Received	05/12/2024
Date Results Expected to be Reported	12/12/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	12 Soil, 1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
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:

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
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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 NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	Metals in Waters -Acid extractable	On Hold
BH101-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓					
BH101-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓					
BH101-0.9-1													✓
BH102-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓					
BH102-0.8-0.9													✓
BH103-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓					
BH103-0.5-0.6													✓
BH104-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓					
BH104-0.5-0.6													✓
SDUP101	✓	✓	✓	✓	✓	✓	✓						
FR101-Shovel									✓	✓	✓	✓	
TB101	✓	✓	✓				✓						
TS101	✓												

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: E36217PT 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: Ktaylor@jkenvironments.com.au

Location: Ulladulla

Sampler: OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6aNEPM	#3	Asbestos (Detection)	BTEX	#6							
4/12/2024	1	BH101	0-0.1	G, A	0.1	F: Silty Clay	X											
4/12/2024	2	BH101	0.4-0.5	G, A	0.1	F: Silty Clay	X											
4/12/2024	3	BH101	0.9-1	G, A	0.1	Silty Clay												
4/12/2024	4	BH102	0-0.1	G, A	0	F: Silty Clay	X											
4/12/2024	5	BH102	0.8-0.9	G, A	0	Silty Clay												
4/12/2024	6	BH103	0-0.1	G, A	0	F: Silty Clay	X											
4/12/2024	7	BH103	0.5-0.6	G, A	0	Silty Clay												
2/12/2024	8	BH104	0-0.1	G, A	0	F: Clayey Sand	X											
2/12/2024	9	BH104	0.5-0.6	G, A	0	Silty Clay												
4/12/2024	10	SDUP101	-	G	-	-					X							
[illegible]																		
4/12/2024	11	FR101-Shovel	-	G1, H, V	-	Water		X										
4/12/2024	12	TB101	-	V	-	-		X										
4/12/2024	13	TS101	-	V	-	-				X								

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar G1 - Amber Glass Bottle
V - BTEX Vial H - HNO3 Wash PVC
A - Ziplock Asbestos Bag

Relinquished By:	Date:	Time:	Received By:	Date:
OB	5/12/24	17:00	ELS SYD	5/12

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

Job No: 368222

Date Received: 5/12/24
Time Received: 1450
Received By: AW
Temp: Cool/Ambient
Cooling: Ice/Icepack 3°C.
Security: Intact/Broken/None

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CERTIFICATE OF ANALYSIS 368222-A

Client Details

Client	JK Environments
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36217PT Ulladulla**
Number of Samples	Additional Combo3 testing
Date samples received	05/12/2024
Date completed instructions received	13/12/2024

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	20/12/2024
Date of Issue	18/12/2024

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Asbestos Approved By
Analysed by Asbestos Approved Analyst:
Authorised by Asbestos Approved Signatory:

Results Approved By
Dragana Tomas, Senior Chemist
Liam Timmins, Organics Supervisor
Loren Bardwell, Development Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		368222-A-3	368222-A-5	368222-A-7	368222-A-9
Your Reference	UNITS	BH101	BH102	BH103	BH104
Depth		0.9-1	0.8-0.9	0.5-0.6	0.5-0.6
Date Sampled		4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	16/12/2024	16/12/2024	16/12/2024	16/12/2024
Date analysed	-	16/12/2024	16/12/2024	16/12/2024	17/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	80	81	84	86

svTRH (C10-C40) in Soil					
Our Reference		368222-A-3	368222-A-5	368222-A-7	368222-A-9
Your Reference	UNITS	BH101	BH102	BH103	BH104
Depth		0.9-1	0.8-0.9	0.5-0.6	0.5-0.6
Date Sampled		4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	16/12/2024	16/12/2024	16/12/2024	16/12/2024
Date analysed	-	17/12/2024	17/12/2024	17/12/2024	17/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	71	71	70	71

PAHs in Soil					
Our Reference		368222-A-3	368222-A-5	368222-A-7	368222-A-9
Your Reference	UNITS	BH101	BH102	BH103	BH104
Depth		0.9-1	0.8-0.9	0.5-0.6	0.5-0.6
Date Sampled		4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	16/12/2024	16/12/2024	16/12/2024	16/12/2024
Date analysed	-	17/12/2024	17/12/2024	17/12/2024	17/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	89	88	89	115

Acid Extractable metals in soil					
Our Reference		368222-A-3	368222-A-5	368222-A-7	368222-A-9
Your Reference	UNITS	BH101	BH102	BH103	BH104
Depth		0.9-1	0.8-0.9	0.5-0.6	0.5-0.6
Date Sampled		4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	16/12/2024	16/12/2024	16/12/2024	16/12/2024
Date analysed	-	17/12/2024	17/12/2024	17/12/2024	17/12/2024
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	12	5	11
Copper	mg/kg	3	<1	2	2
Lead	mg/kg	3	7	4	3
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	<1	<1
Zinc	mg/kg	<1	<1	<1	2

Moisture					
Our Reference		368222-A-3	368222-A-5	368222-A-7	368222-A-9
Your Reference	UNITS	BH101	BH102	BH103	BH104
Depth		0.9-1	0.8-0.9	0.5-0.6	0.5-0.6
Date Sampled		4/12/2024	4/12/2024	4/12/2024	2/12/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	16/12/2024	16/12/2024	16/12/2024	16/12/2024
Date analysed	-	17/12/2024	17/12/2024	17/12/2024	17/12/2024
Moisture	%	15	16	14	19

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-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.

Method ID	Methodology Summary
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-5	[NT]
Date extracted	-			16/12/2024	[NT]	[NT]	[NT]	[NT]	16/12/2024	[NT]
Date analysed	-			17/12/2024	[NT]	[NT]	[NT]	[NT]	17/12/2024	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	93	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	92	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	92	[NT]	[NT]	[NT]	[NT]	86	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/12/2024	[NT]	[NT]	[NT]	[NT]	16/12/2024	[NT]
Date analysed	-			17/12/2024	[NT]	[NT]	[NT]	[NT]	17/12/2024	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	81	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	81	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	71	[NT]	[NT]	[NT]	[NT]	75	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			16/12/2024	[NT]	[NT]	[NT]	[NT]	16/12/2024	[NT]
Date analysed	-			17/12/2024	[NT]	[NT]	[NT]	[NT]	17/12/2024	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	80	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	97	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			16/12/2024	[NT]	[NT]	[NT]	[NT]	16/12/2024	[NT]
Date analysed	-			17/12/2024	[NT]	[NT]	[NT]	[NT]	17/12/2024	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	93	[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	Katrina Taylor

Sample Login Details

Your reference	E36217PT Ulladulla
Envirolab Reference	368222-A
Date Sample Received	05/12/2024
Date Instructions Received	13/12/2024
Date Results Expected to be Reported	20/12/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	Additional Combo3 testing
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
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:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	On Hold
BH101-0-0.1					✓
BH101-0.4-0.5					✓
BH101-0.9-1	✓	✓	✓	✓	
BH102-0-0.1					✓
BH102-0.8-0.9	✓	✓	✓	✓	
BH103-0-0.1					✓
BH103-0.5-0.6	✓	✓	✓	✓	
BH104-0-0.1					✓
BH104-0.5-0.6	✓	✓	✓	✓	
SDUP101					✓
FR101-Shovel					✓
TB101					✓
TS101					✓
BH101 - [TRIPLICATE]-0-0.1					✓

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.

ELS Reference #: 368222-A
Requested TAT: Standard
Due: 20/12/24

SP.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200
E SPark@envirolab.com.au | W www.envirolab.com.au

Follow us on: LinkedIn | Facebook | Twitter

Samples will be analysed per our T&C's.

From: Katrina Taylor <KTaylor@jkenvironments.com.au>
Sent: Thursday, 12 December 2024 3:51 PM
To: Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>
Subject: FW: Results for Registration 368222 E36217PT Ulladulla

Good afternoon,

Please schedule the following samples for #3 on standard TA:

#3 – BH101 ~~(0.4-0.5)~~ SP (0.9-1)
#5 – BH102 (0.8-0.9)
#7 – BH103 (0.5-0.6)
#9 – BH104 (0.5-0.6)

Thank you.

Regards
Katrina Taylor
Senior Associate | Environmental Scientist
NSW Licensed Asbestos Assessor

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D: +61 418 481 628
E: KTaylor@jkenvironments.com.au
www.jkenvironments.com.au

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NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Lucy Zhu <LZhu@envirolab.com.au>
Sent: Wednesday, 11 December 2024 6:49 PM
To: Katrina Taylor <KTaylor@jkenvironments.com.au>
Subject: Results for Registration 368222 E36217PT Ulladulla

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC/paperwork received from you
an Excel or .csv file containing the results

#368222-A
13/12/24 SP

Sarah Park

From: Katrina Taylor <KTaylor@jkenvironments.com.au>
Sent: Friday, 13 December 2024 6:58 AM
To: Sarah Park
Subject: RE: Results for Registration 368222 E36217PT Ulladulla

Follow Up Flag: Follow up
Flag Status: Flagged

It is, thank you for picking that up 😊

Regards
Katrina Taylor
Senior Associate | Environmental Scientist
NSW Licensed Asbestos Assessor

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D: +61 418 481 628
E: KTaylor@jkenvironments.com.au
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MACQUARIE PARK NSW 2113

JKEnvironments

From: Sarah Park <SPark@envirolab.com.au>
Sent: Thursday, 12 December 2024 4:46 PM
To: Katrina Taylor <KTaylor@jkenvironments.com.au>; Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>
Subject: RE: Results for Registration 368222 E36217PT Ulladulla

---

Hi Katrina,

Thanks for your email – I will organise additional Combo #3 testing for as an A-job.

Just confirming one thing, sample BH101 (0.4-0.5) has already been analysed for Combo #6NEPM in the original job. Is the additional testing meant for sample BH101 (0.9-1) instead?

Kind Regards,

Sarah Park | Customer Service | Envirolab Services

Great Science. Great Service.

Envirolab Services Pty Ltd
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Certificate of Analysis MFL0210

Client Details

Client	JK Environments
Contact	Katrina Taylor
Address	115 Wicks Road, Macquarie Park, NSW, 2113

Sample Details

Your Reference	E36217PT
Number of Samples	1 Soil
Date Samples Received	10/12/2024
Date Instructions Received	10/12/2024

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 soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	16/12/2024
Date of Issue	12/12/2024

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

Authorisation Details

Results Approved By	Tara White, Metals Supervisor Tianna Milburn, Operations Manager
Laboratory Manager	Chris De Luca

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
MFL0210-01	SDUP102	Soil	04/12/2024	10/12/2024

Volatile TRH and BTEX (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
TRH C6-C9	mg/kg	25	<25
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50
Benzene	mg/kg	0.20	<0.20
Toluene	mg/kg	0.50	<0.50
Ethylbenzene	mg/kg	1.0	<1.0
meta+para Xylene	mg/kg	2.0	<2.0
ortho-Xylene	mg/kg	1.0	<1.0
Total Xylene	mg/kg	3.0	<3.0
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0
Surrogate aaa-Trifluorotoluene	%		*67.0*

Semi-volatile TRH (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
TRH C10-C14	mg/kg	50	<50
TRH C15-C28	mg/kg	100	<100
TRH C29-C36	mg/kg	100	<100
Total +ve TRH C10-C36	mg/kg	50	<50
TRH >C10-C16	mg/kg	50	<50
TRH >C10-C16 less Naphthalene F2	mg/kg	50	<50
TRH >C16-C34 (F3)	mg/kg	100	<100
TRH >C34-C40 (F4)	mg/kg	100	<100
Total +ve TRH >C10-C40	mg/kg	50	<50
Surrogate o-Terphenyl	%		*77.2*

Polycyclic Aromatic Hydrocarbons (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
Naphthalene	mg/kg	0.10	<0.10
Acenaphthylene	mg/kg	0.10	<0.10
Acenaphthene	mg/kg	0.10	<0.10
Fluorene	mg/kg	0.10	<0.10
Phenanthrene	mg/kg	0.10	<0.10
Anthracene	mg/kg	0.10	<0.10
Fluoranthene	mg/kg	0.10	<0.10
Pyrene	mg/kg	0.10	<0.10
Benzo(a)anthracene	mg/kg	0.10	<0.10
Chrysene	mg/kg	0.10	<0.10
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20
Benzo(a)pyrene	mg/kg	0.050	<0.050
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10
Total +ve PAH	mg/kg	0.050	<0.050
Benzo(a)pyrene TEQ calc zero	mg/kg	0.50	<0.50
Benzo(a)pyrene TEQ calc Half	mg/kg	0.50	<0.50
Benzo(a)pyrene TEQ calc PQL	mg/kg	0.50	<0.50
Surrogate p-Terphenyl-D14	%		*96.6*

Organochlorine Pesticides (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
alpha-BHC	mg/kg	0.10	<0.10
Hexachlorobenzene	mg/kg	0.10	<0.10
beta-BHC	mg/kg	0.10	<0.10
gamma-BHC	mg/kg	0.10	<0.10
delta-BHC	mg/kg	0.10	<0.10
Heptachlor	mg/kg	0.10	<0.10
Aldrin	mg/kg	0.10	<0.10
Heptachlor epoxide	mg/kg	0.10	<0.10
trans-Chlordane	mg/kg	0.10	<0.10
cis-Chlordane	mg/kg	0.10	<0.10
Endosulfan I	mg/kg	0.10	<0.10
4,4'-DDE	mg/kg	0.10	<0.10
Dieldrin	mg/kg	0.10	<0.10
Endrin	mg/kg	0.10	<0.10
4,4'-DDD	mg/kg	0.10	<0.10
Endosulfan II	mg/kg	0.10	<0.10
Endrin aldehyde	mg/kg	0.10	<0.10
4,4'-DDT	mg/kg	0.10	<0.10
Endosulfan sulfate	mg/kg	0.10	<0.10
Endrin ketone	mg/kg	0.10	<0.10
Methoxychlor	mg/kg	0.10	<0.10
Mirex	mg/kg	0.10	<0.10
Total +ve DDT+DDD+DDE	mg/kg	0.10	<0.10
Total +ve Aldrin + Dieldrin	mg/kg	0.10	<0.10
Total +ve OCP	mg/kg	0.10	<0.10
Surrogate 4-chloro-3-nitrobenzotrifluoride	%		*74.5*

Organophosphorus Pesticides (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
Dichlorvos	mg/kg	0.10	<0.10
Dimethoate	mg/kg	0.10	<0.10
Diazinon	mg/kg	0.10	<0.10
Chlorpyrifos-methyl	mg/kg	0.10	<0.10
Ronnel	mg/kg	0.10	<0.10
Fenitrothion	mg/kg	0.10	<0.10
Malathion	mg/kg	0.10	<0.10
Chlorpyrifos	mg/kg	0.10	<0.10
Parathion	mg/kg	0.10	<0.10
Bromophos-ethyl	mg/kg	0.10	<0.10
Ethion	mg/kg	0.10	<0.10
Coumaphos	mg/kg	0.10	<0.10
Disulfoton	mg/kg	0.10	<0.10
Fenamiphos	mg/kg	0.10	<0.10
Fenthion	mg/kg	0.10	<0.10
Methidathion	mg/kg	0.10	<0.10
Mevinphos	mg/kg	0.10	<0.10
Parathion-methyl	mg/kg	0.10	<0.10
Phorate	mg/kg	0.10	<0.10
Phosalone	mg/kg	0.10	<0.10
Azinphos-methyl	mg/kg	0.10	<0.10
Surrogate 4-chloro-3-nitrobenzotrifluoride	%		*74.5*

Polychlorinated Biphenyls (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
Aroclor 1016	mg/kg	0.10	<0.10
Aroclor 1221	mg/kg	0.10	<0.10
Aroclor 1232	mg/kg	0.10	<0.10
Aroclor 1242	mg/kg	0.10	<0.10
Aroclor 1248	mg/kg	0.10	<0.10
Aroclor 1254	mg/kg	0.10	<0.10
Aroclor 1260	mg/kg	0.10	<0.10
Total +ve PCB (1016-1260)	mg/kg	0.10	<0.10
Surrogate 2-Fluorobiphenyl	%		*93.3*

Acid Extractable Metals (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
Arsenic	mg/kg	4.0	<4.0
Cadmium	mg/kg	0.40	<0.40
Chromium	mg/kg	1.0	7.5
Copper	mg/kg	1.0	6.3
Mercury	mg/kg	0.10	<0.10
Nickel	mg/kg	1.0	2.5
Lead	mg/kg	1.0	7.3
Zinc	mg/kg	1.0	19

Inorganics - Moisture (Soil)

Envirolab ID	Units	PQL	MFL0210-01
Your Reference			SDUP102
Date Sampled			04/12/2024
Moisture	%	0.10	16

Method Summary

Method ID	Methodology Summary
INORG-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
METALS-020	Determination of various metals by ICP-OES.
METALS-021	Determination of Mercury by Cold Vapour AAS.
ORG-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
ORG-021/022/025_PCB	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS.
ORG-022	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.
ORG-022_OC	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.
ORG-022_PAH	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and solids using DCM/Acetone/Methanol. For PAHs:- Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. 1. 'TEQ 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. 'TEQ 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. 'TEQ 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, for Total +ve calculations, the PQL is reflective of the lowest individual PQL and therefore, for example, "Total +ve PAHs" is simply a sum of the positive individual PAHs.
ORG-023_F1_TOT	Determination of volatile organic compounds (VOCs) by P&T-GC-MS. Water samples are analysed directly by purge and trap GC-MS. Solids are extracted with Methanol, diluted and analysed 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 therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

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.

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.

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.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

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.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

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 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

Miscellaneous Information

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. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

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 or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary MFL0210

Client Details

Client	JK Environments
Your Reference	E36217PT
Date Issued	12/12/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	No	Matrix Spike Outliers Exist - See detailed list below
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary MFL0210

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
vTRH&MBTEXN | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
sTRH | Soil	1	04/12/2024	10/12/2024	11/12/2024	Yes
PAH | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
OCP | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
OPP (21 list) | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
PCB | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
Metals | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
Metals-Hg | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes
Moisture | Soil	1	04/12/2024	10/12/2024	12/12/2024	Yes

Outliers: Matrix Spike

ORG-020|Semi-volatile TRH (Soil)| Batch BFL1740

Sample ID	Analyte	% Limits	% Recovery
BFL1740-MS1#	TRH >C34-C40 (F4)	60 - 140	##[2]

ORG-022_PAH|Polycyclic Aromatic Hydrocarbons (Soil)| Batch BFL1740

Sample ID	Analyte	% Limits	% Recovery
BFL1740-MS2#	Benzo(a)pyrene	60 - 140	##[1]

Quality Control MFL0210

ORG-023_F1_TOT|Volatile TRH and BTEX (Soil) | Batch BFL1739

Analyte	Units	PQL	Blank	DUP1 BFL1739-DUP1# Samp | QC | RPD %	DUP2 BFL1739-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1739-MS2#
TRH C6-C9	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	63.1	64.9
TRH C6-C10	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	67.5	66.7
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	[NA]	[NA]
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50	<0.50 | <0.50 | [NA]	<0.50 | <0.50 | [NA]	[NA]	[NA]
Benzene	mg/kg	0.20	<0.20	<0.20 | <0.20 | [NA]	<0.20 | <0.20 | [NA]	64.2	62.0
Toluene	mg/kg	0.50	<0.50	<0.50 | <0.50 | [NA]	<0.50 | <0.50 | [NA]	66.3	70.1
Ethylbenzene	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	60.6	69.2
meta+para Xylene	mg/kg	2.0	<2.0	<2.0 | <2.0 | [NA]	<2.0 | <2.0 | [NA]	60.0	77.4
ortho-Xylene	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	60.5	74.5
Total Xylene	mg/kg	3.0	<3.0	<3.0 | <3.0 | [NA]	<3.0 | <3.0 | [NA]	[NA]	[NA]
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	[NA]	[NA]
Surrogate aaa-Trifluorotoluene	*%*		*62.2*	*64.8 | 64.0*	*74.1 | 62.8*	*60.6*	*69.6*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

ORG-020|Semi-volatile TRH (Soil) | Batch BFL1740

Analyte	Units	PQL	Blank	DUP1 BFL1740-DUP1# Samp | QC | RPD %	DUP2 BFL1740-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1740-MS1#
TRH C10-C14	mg/kg	50	<50	<50 | <50 | [NA]		114	112
TRH C15-C28	mg/kg	100	<100	<100 | <100 | [NA]		89.4	87.8
TRH C29-C36	mg/kg	100	<100	<100 | <100 | [NA]		96.9	71.8
TRH >C10-C16	mg/kg	50	<50	<50 | <50 | [NA]		88.2	87.0
TRH >C16-C34 (F3)	mg/kg	100	<100	<100 | <100 | [NA]		92.1	89.4
TRH >C34-C40 (F4)	mg/kg	100	<100	<100 | <100 | [NA]		90.7	##[2]
Surrogate o-Terphenyl	*%*		*78.8*	*78.5 | 77.8*		*85.4*	*82.3*

Analyte	Units	PQL	Blank	DUP3 BFL1740-DUP3# Samp | QC | RPD %	DUP4 BFL1740-DUP4# Samp | QC | RPD %	LCS %
TRH C10-C14	mg/kg	50		<50 | <50 | [NA]		[NA]
TRH C15-C28	mg/kg	100		<100 | <100 | [NA]		[NA]
TRH C29-C36	mg/kg	100		111 | 116 | [NA]		[NA]
TRH >C10-C16	mg/kg	50		<50 | <50 | [NA]		[NA]
TRH >C16-C34 (F3)	mg/kg	100		161 | 166 | [NA]		[NA]
TRH >C34-C40 (F4)	mg/kg	100		<100 | <100 | [NA]		[NA]
Surrogate o-Terphenyl	*%*			*78.8 | 79.5*		*[NA]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control MFL0210

ORG-022_PAH | Polycyclic Aromatic Hydrocarbons (Soil) | Batch BFL1740

Analyte	Units	PQL	Blank	DUP1 BFL1740-DUP1# Samp | QC | RPD %	DUP2 BFL1740-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1740-MS2#
Naphthalene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		94.1	107
Acenaphthylene	mg/kg	0.10	<0.10	0.118 | 0.171 | [NA]		[NA]	[NA]
Acenaphthene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		94.1	101
Fluorene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		97.2	101
Phenanthrene	mg/kg	0.10	<0.10	0.274 | 0.484 | [NA]		136	102
Anthracene	mg/kg	0.10	<0.10	0.122 | 0.182 | [NA]		[NA]	[NA]
Fluoranthene	mg/kg	0.10	<0.10	0.740 | 1.11 | 39.7		91.2	91.9
Pyrene	mg/kg	0.10	<0.10	0.859 | 1.25 | 37.3		99.0	90.3
Benzo(a)anthracene	mg/kg	0.10	<0.10	0.368 | 0.557 | [NA]		[NA]	[NA]
Chrysene	mg/kg	0.10	<0.10	0.552 | 0.761 | 31.9		92.8	104
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20	0.506 | 0.744 | [NA]		[NA]	[NA]
Benzo(a)pyrene	mg/kg	0.050	<0.050	0.250 | 0.382 | 41.7		69.8	##[1]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10	0.188 | 0.265 | [NA]		[NA]	[NA]
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10	0.213 | 0.286 | [NA]		[NA]	[NA]
Surrogate p-Terphenyl-D14	*%*		*97.3*	*94.3 | 99.2*		*107*	*99.4*

Analyte	Units	PQL	Blank	DUP3 BFL1740-DUP3# Samp | QC | RPD %	DUP4 BFL1740-DUP4# Samp | QC | RPD %	LCS %
Naphthalene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Acenaphthylene	mg/kg	0.1		0.718 | 0.642 | 11.2		[NA]
Acenaphthene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fluorene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phenanthrene	mg/kg	0.1		0.437 | 0.380 | [NA]		[NA]
Anthracene	mg/kg	0.1		0.483 | 0.423 | [NA]		[NA]
Fluoranthene	mg/kg	0.1		2.69 | 2.44 | 9.56		[NA]
Pyrene	mg/kg	0.1		3.38 | 3.05 | 10.2		[NA]
Benzo(a)anthracene	mg/kg	0.1		1.76 | 1.58 | 10.7		[NA]
Chrysene	mg/kg	0.1		2.39 | 2.19 | 8.54		[NA]
Benzo(b,j,k)fluoranthene	mg/kg	0.2		5.08 | 4.95 | 2.66		[NA]
Benzo(a)pyrene	mg/kg	0.05		2.73 | 2.60 | 4.83		[NA]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1		2.09 | 1.91 | 9.04		[NA]
Dibenzo(a,h)anthracene	mg/kg	0.1		0.363 | 0.340 | [NA]		[NA]
Benzo(g,h,i)perylene	mg/kg	0.1		2.05 | 1.82 | 12.1		[NA]
Surrogate p-Terphenyl-D14	*%*			*103 | 99.5*		*[NA]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control MFL0210

ORG-022_OC|Organochlorine Pesticides (Soil) | Batch BFL1740

Analyte	Units	PQL	Blank	DUP1 BFL1740-DUP1# Samp | QC | RPD %	DUP2 BFL1740-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1740-MS2#
alpha-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		71.3	83.8
Hexachlorobenzene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
beta-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		113	104
gamma-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
delta-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Heptachlor	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		91.4	90.0
Aldrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		69.6	78.5
Heptachlor epoxide	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		133	138
trans-Chlordane	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
cis-Chlordane	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endosulfan I	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
4,4'-DDE	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		84.6	92.9
Dieldrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		75.6	83.5
Endrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		79.3	106
4,4'-DDD	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		84.7	104
Endosulfan II	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endrin aldehyde	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
4,4'-DDT	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endosulfan sulfate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		82.6	99.8
Endrin ketone	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Methoxychlor	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Mirex	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*		*66.0*	*65.9 | 67.6*		*90.0*	*90.1*

Analyte	Units	PQL	Blank	DUP3 BFL1740-DUP3# Samp | QC | RPD %	DUP4 BFL1740-DUP4# Samp | QC | RPD %	LCS %
alpha-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Hexachlorobenzene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
beta-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
gamma-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
delta-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Heptachlor	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aldrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Heptachlor epoxide	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
trans-Chlordane	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
cis-Chlordane	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan I	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDE	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Dieldrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDD	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan II	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin aldehyde	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDT	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan sulfate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin ketone	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Methoxychlor	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Mirex	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*			*71.9 | 69.6*		*[NA]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control MFL0210

ORG-022|Organophosphorus Pesticides (Soil) | Batch BFL1740

Analyte	Units	PQL	Blank	DUP1 BFL1740-DUP1# Samp | QC | RPD %	DUP2 BFL1740-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1740-MS2#
Dichlorvos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		66.7	75.2
Dimethoate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Diazinon	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Chlorpyrifos-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		74.6	105
Ronnel	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		93.6	116
Fenitrothion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		60.5	90.5
Malathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		66.4	82.8
Chlorpyrifos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		108	130
Parathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		71.7	93.4
Bromophos-ethyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Ethion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		75.7	97.1
Coumaphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Disulfoton	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Fenamiphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Fenthion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Methidathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Mevinphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Parathion-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Phorate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Phosalone	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Azinphos-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*		*66.0*	*65.9 | 67.6*		*90.0*	*90.1*

Analyte	Units	PQL	Blank	DUP3 BFL1740-DUP3# Samp | QC | RPD %	DUP4 BFL1740-DUP4# Samp | QC | RPD %	LCS %
Dichlorvos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Dimethoate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Diazinon	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Chlorpyrifos-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Ronnel	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenitrothion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Malathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Chlorpyrifos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Parathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Bromophos-ethyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Ethion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Coumaphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Disulfoton	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenamiphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenthion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Methidathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Mevinphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Parathion-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phorate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phosalone	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Azinphos-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*			*71.9 | 69.6*		*[NA]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control MFL0210

ORG-021/022/025_PCB | Polychlorinated Biphenyls (Soil) | Batch BFL1740

Analyte	Units	PQL	Blank	DUP1 BFL1740-DUP1# Samp | QC | RPD %	DUP2 BFL1740-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1740-MS2#
Aroclor 1016	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1221	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1232	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1242	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1248	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1254	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1260	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
PCB C103	mg/kg			0.00 | 0.00 | [NA]		126	138
Surrogate 2-Fluorobiphenyl	*%*		*88.6*	*91.1 | 92.7*		*104*	*105*

Analyte	Units	PQL	Blank	DUP3 BFL1740-DUP3# Samp | QC | RPD %	DUP4 BFL1740-DUP4# Samp | QC | RPD %	LCS %
Aroclor 1016	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1221	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1232	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1242	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1248	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1254	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1260	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
PCB C103	mg/kg			0.00 | 0.00 | [NA]		[NA]
Surrogate 2-Fluorobiphenyl	*%*			*93.5 | 87.8*		*[NA]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-020 | Acid Extractable Metals (Soil) | Batch BFL1738

Analyte	Units	PQL	Blank	DUP1 BFL1738-DUP1# Samp | QC | RPD %	DUP2 BFL1738-DUP2# Samp | QC | RPD %	LCS %	Spike % BFL1738-MS1#
Arsenic	mg/kg	4.0	<4.0	<4.0 | <4.0 | [NA]		97.3	103
Cadmium	mg/kg	0.40	<0.40	<0.40 | <0.40 | [NA]		99.0	95.0
Chromium	mg/kg	1.0	<1.0	6.49 | 5.72 | 12.6		95.4	93.6
Copper	mg/kg	1.0	<1.0	6.92 | 6.34 | 8.74		93.7	99.8
Lead	mg/kg	1.0	<1.0	13.9 | 9.36 | 38.9		96.2	86.9
Mercury	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		102	103
Nickel	mg/kg	1.0	<1.0	6.74 | 6.14 | 9.21		94.6	91.3
Zinc	mg/kg	1.0	<1.0	13.8 | 11.0 | 22.9		96.0	81.9

Analyte	Units	PQL	Blank	DUP3 BFL1738-DUP3# Samp | QC | RPD %	DUP4 BFL1738-DUP4# Samp | QC | RPD %	LCS %
Arsenic	mg/kg	4		91.1 | 98.8 | 8.12		[NA]
Cadmium	mg/kg	0.4		<0.40 | <0.40 | [NA]		[NA]
Chromium	mg/kg	1		17.8 | 17.6 | 1.18		[NA]
Copper	mg/kg	1		33.0 | 32.3 | 1.89		[NA]
Lead	mg/kg	1		64.2 | 72.0 | 11.5		[NA]
Mercury	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Nickel	mg/kg	1		12.8 | 13.6 | 6.16		[NA]
Zinc	mg/kg	1		119 | 122 | 2.35		[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-008 | Inorganics - Moisture (Soil) | Batch BFL1733

Analyte	Units	PQL	Blank	DUP1 BFL1733-DUP1# Samp | QC | RPD %	DUP2 BFL1733-DUP2# Samp | QC | RPD %	LCS %
Moisture	%	0.1		7.59 | 6.74 | 11.9	28.5 | 35.3 | 21.2	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

QC Comments

Identifier	Description
[1]	Spike recovery is not applicable due to the relatively high analyte background in the sample (>3* spike level). However, the LCS recovery is within acceptance criteria.
[2]	Spike recovery is outside routine acceptance criteria (60-140%), this may be due to suspected non-homogeneity and/or matrix interference effects. However, an acceptable recovery was achieved for the LCS.

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Sample Receipt Advice MFL0210

Client Details

Client	JK Environments
Attention	Katrina Taylor

Sample Login Details

Your Reference	E36217PT
Envirolab Reference	MFL0210
Date Sample Received	10/12/2024
Date Instructions Received	10/12/2024
Date Final Results Expected	16/12/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
Number of Samples	1 Soil
Turnaround Time	4 Days
Temperatures / Cooling Methods	11.9°C Ice Pack

Additional Info

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

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

Where no sampling date has been supplied for some or all samples, the date of sample receipt has been used as the associated sampling date. The sampling dates are used to assess compliance to recommended Technical Holding Times.

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).

Please direct any queries to:

Pamela Adams

Phone	03 9763 2500
Email	padams@envirolab.com.au

Chris De Luca

Phone	03 9763 2500
Email	cdeluca@envirolab.com.au

Analysis underway, details on the following page

Sample Receipt Advice MFL0210

Analysis Grid

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

	Combination 6	Moisture
MFL0210-01 Soil | 04/12/2024 SDUP102	•	•

Suite Details

Suite Name	Suite Analyses
Combination 6 |Soil	vTRH&MBTEXN, sTRH, PAH, OCP, OPP (21 list), PCB, As, Cd, Cr, Cu, Hg, Ni, Pb, Zn

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: E36217PT 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: Ktaylor@jkenvironments.com.au

Location:	Ulladulla	Sample Preserved in Esky on Ice
Sampler:	OB	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6aNEPM	#3	Asbestos (Detection)	BTEX	#6							
4/12/2024	1	BH101	0-0.1	G, A	0.1	F: Silty Clay	X											
4/12/2024	2	BH101	0.4-0.5	G, A	0.1	F: Silty Clay	X											
4/12/2024	3	BH101	0.9-1	G, A	0.1	Silty Clay												
4/12/2024	4	BH102	0-0.1	G, A	0	F: Silty Clay	X											
4/12/2024	5	BH102	0.8-0.9	G, A	0	Silty Clay												
4/12/2024	6	BH103	0-0.1	G, A	0	F: Silty Clay	X											
4/12/2024	7	BH103	0.5-0.6	G, A	0	Silty Clay												
2/12/2024	8	BH104	0-0.1	G, A	0	F: Clayey Sand	X											
2/12/2024	9	BH104	0.5-0.6	G, A	0	Silty Clay												
4/12/2024	10	SDUP101	-	G	-	-					X							
4/12/2024	S/10	SDUP102	-	G	-	-					X							
4/12/2024	11	FR101-Shovel	-	G1, H, V	-	Water		X										
4/12/2024	12	TB101	-	V	-	-		X										
4/12/2024	13	TS101	-	V	-	-				X								

Please send to melbourne envirolab

Envirolab Services
25 Research Drive
Croydon South VIC 3136
P: (03) 9763 2500
Job No: MELO210
Date Received: 12/12/24
Time Received: 1:40
Received By: JS
Temp: Cool/Ambient 11.9
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar G1 - Amber Glass Bottle V - BTEX Vial H - HNO3 Wash PVC A - Ziplock Asbestos Bag

Relinquished By:	Date:	Time:	Received By:	Date:
OB	5/12/24	17:00	ELS SYD	5/12

Relinquished by ELS SYD
O.Williams
9/12/24 1130.

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

Job No: 368222
Date Received: 5/12/24
Time Received: 1450
Received By: AW
Temp: Cool/Ambient
Cooling: Ice/Icepack 3°C.
Security: Intact/Broken/None

Appendix E: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[14] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[15]. The NEPM (2013) is consistent with these documents.

A. Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection Limit for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations: *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" (Keith, 1991).

B. Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD).

C. Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes. Accuracy is typically reported as percent recovery.

D. Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

E. Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;

[14] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[15] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

F. Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

G. Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling, transport and analysis.

H. Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

I. Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

J. Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$

Appendix F: Data (QA/QC) Evaluation

Data (QA/QC) Evaluation

A. INTRODUCTION

This Data (QA/QC) Evaluation forms part of the validation process for the DQOs documented in the SAQP attached in the appendices of this report. Checks were made to assess the data in terms of precision, accuracy, representativeness, comparability and completeness. These 'PARCC' parameters are referred to collectively as DQIs and are defined in the Report Explanatory Notes attached in the report appendices.

1. Field and Laboratory Considerations

The quality of the analytical data produced for this project has been considered in relation to the following:

- Sample collection, storage, transport and analysis;
- Laboratory PQLs;
- Field QA/QC results; and
- Laboratory QA/QC results.

2. Field QA/QC Samples and Analysis

The results for the field QA/QC samples are detailed in the laboratory summary table, Table Q1, attached to the investigation report and are discussed in the subsequent sections of this Data (QA/QC) Evaluation report. A summary of the field QA/QC samples collected and analysed for this investigation is provided in the following table:

Sample Type	Number Analysed	Frequency (of Sample Type)
Intra-laboratory duplicate (soil)	1	Approximately 11% of primary samples
Inter-laboratory duplicate (soil)	1	As above
Trip spike soil	1	One for the investigation to demonstrate adequacy of preservation, storage and transport methods
Trip blank soil	1	One for the investigation to demonstrate adequacy of storage and transport methods
Rinsate (pendulum auger)	1	One for the investigation to demonstrate adequacy of decontamination methods

3. Data Assessment Criteria

JKE adopted the following criteria for assessing the field and laboratory QA/QC analytical results:

Field Duplicates

Acceptable targets for precision of field duplicates in this report will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Field/Trip Blanks and Rinsates

Acceptable targets for field blank and rinsate samples in this report will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to typical background concentrations in soils and published drinking water guidelines for waters.

Trip Spikes

Acceptable targets for trip spike samples in this report will be 70% to 130%.

Laboratory QA/QC

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the laboratory reports. These criteria were developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the acceptable limits adopted by the primary laboratory (Envirolab) is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics;
- 60-140% recovery acceptable for organics; and
- 10-140% recovery acceptable for VOCs.

Surrogate Spikes

- 60-140% recovery acceptable for general organics; and
- 10-140% recovery acceptable for VOCs.

Method Blanks

- All results less than PQL.

B. DATA EVALUATION

1. Sample Collection, Storage, Transport and Analysis

Samples were collected by trained field staff in accordance with our standard sampling procedures. Field sampling procedures were designed to be consistent with relevant guidelines, including NEPM (2013) and other guidelines made under the CLM Act 1997.

Appropriate sample preservation, handling and storage procedures were adopted. Laboratory analysis was undertaken within specified holding times generally in accordance with Schedule B(3) of NEPM (2013) and the laboratory NATA accredited methodologies.

Envirolab noted that the asbestos results were reported to be consistent with the recommendations in NEPM (2013), however this level of reporting is outside the scope of their NATA accreditation. In the absence of

other available analytical methods for asbestos, this was found to be acceptable for the purpose of this investigation.

Review of the project data also indicated that:

- COC documentation was adequately maintained;
- Sample receipt advice documentation was provided for all sample batches;
- All analytical results were reported; and
- Consistent units were used to report the analysis results.

2. Laboratory PQLs

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC.

3. Field QA/QC Sample Results

Field Duplicates

The results indicated that field precision was acceptable. An RPD non-conformance was reported for TRH F3 in SDUP101/BH101 (0-0.1m). This values outside the acceptable limits has been attributed to results very close to the PQL. As both the primary and duplicate sample results were substantially less than the SAC, the exceedance is not considered to have had an adverse impact on the data set as a whole.

Field/Trip Blanks

During the investigation, one soil trip blank was placed in the esky during sampling and transported back to the laboratory. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur.

Rinsates

With the exception of TRH F1 and copper, all results were below the PQL. The detectable concentration of light fraction TRH F1 is attributed to trihalomethanes as noted in Envirolab report 368222. These compounds are breakdown products from the chlorination process and are common in potable water at the concentration reported (the Australian drinking water guideline for total trihalomethanes is 250µg/L). Similarly, the low-level metal concentration (i.e. copper) is typical in potable water which is utilised as blank material. In JKE's experience, the concentrations reported were consistent with background concentrations in potable water and were not indicative of cross-contamination.

Trip Spikes

The results ranged from 89% to 112% and indicated that field preservation methods were appropriate.

4. Laboratory QA/QC

The analytical methods implemented by the laboratory were performed in accordance with their NATA accreditation and were consistent with Schedule B(3) of NEPM (2013). The frequency of data reported for the laboratory QA/QC (i.e. duplicates, spikes, blanks, LCS) was considered to be acceptable for the purpose of this investigation.

A review of the laboratory QA/QC data identified the following:

Envirolab report 368222 reported a minor non-conformance in regards to Acid Extractable Metals in Soil. The laboratory RPD acceptance criteria was exceeded for copper and zinc in one sample, therefore a triplicate result was issued.

Envirolab report MFL0210 reported a minor non-conformance in regards to matrix spike outliers. The report notes that Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default.

C. DATA QUALITY SUMMARY

JKE is of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

Non-conformances were reported for some field QA/QC samples and laboratory QA/QC analysis. These non-conformances were considered to be sporadic and minor, and were not considered to be indicative of systematic sampling or analytical errors. On this basis, these non-conformances are not considered to materially impact the report findings.

Appendix G: Field Work Documents

REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

SAMPLING ANALYSIS AND QUALITY PLAN FOR DETAILED SITE INVESTIGATION

FOR

ULLADULLA HIGH SCHOOL UPGRADES

AT

55 SOUTH STREET, ULLADULLA, NSW

Date: 28 November 2024

Ref: E36217PTrpt4-SAQP

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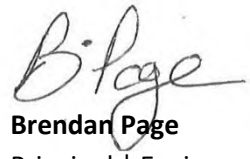

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Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Before You Dig Australia	**BYDA**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environment Protection Authority	**EPA**
Fibre Cement Fragment(s)	**FCF**
General Approval of Immobilisation	**GAI**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Polychlorinated Biphenyls	**PCB**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
State Environmental Planning Policy	**SEPP**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**

Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Work Health and Safety	**WHS**

1 INTRODUCTION

NSW Department of Education ('the client') commissioned JK Environments (JKE) to prepare a Sampling Analysis and Quality Plan (SAQP) for the Detailed Site Investigation (DSI) to be undertaken by JKE for the upgrades at Ulladulla High School, 55 South Street, Ulladulla, NSW ('the site'). The site location is shown on Figure 1 and the proposed investigation will be confined to the site boundaries as shown on Figure 2 attached in the appendices.

JKE has previously undertaken a Preliminary (Desktop) Site Investigation and Preliminary (Intrusive) Site Investigation at the site. A summary of this information has been included in Section 2.

1.1 Proposed Development Details

It is understood the proposed development includes a new two-storey classroom on the north-western side of the existing building cluster on the wider school property. An elevated walkway is proposed to link the first-floor level of the new building with the existing two-storey Block M (to the south-east). For the purpose of the DSI, the site captures the proposed development footprint only, as requested by the client.

1.2 Aims and Objectives

The primary aims of the investigation are to characterise the soil contamination conditions in order to assess site risks in relation to contamination and inform the preparation of a Remediation Action Plan (RAP) if required. A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during the proposed development works.

The DSI objectives are to:

- Assess the current site conditions and use(s) via a site walkover inspection;
- Summarise potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Document an iteration and review of the conceptual site model (CSM);
- Assess the soil contamination conditions via implementation of a sampling and analysis program;
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

1.3 Scope of Work

This SAQP was prepared generally in accordance with the due diligence panel work order (DDWO06919/24) dated 28 November 2024.

The scope of work included review of the previous reports and preparation of an SAQP with regards to National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[1], and other guidelines made under or with regards to the Contaminated Land Management Act (1997)[2].

A list of reference documents/guidelines is included in the appendices.

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

[2] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

2 SITE INFORMATION

2.1 Background

A summary of relevant information from the previous JKE investigations is outlined in the table below:

Table 2-1: Previous information summary

Report	Summary of relevant information
Preliminary (Desktop) Site Investigation, 2023[3]	A desktop PSI was undertaken by JKE in August 2023 for the wider school property. The Desktop included a review of historical information and other relevant information for the wider school property, a walkover inspection, and preparation of a preliminary CSM. During the site information review, JKE identified an existing asbestos register for the buildings and structures on the wider school property that indicated the site buildings did not contain asbestos, but buildings and structures on the wider school property did. The site history review indicated that the site and wider school property was likely utilised as residential, council/government owned land and undeveloped scrubland/ bushland between the mid-1800s and 1900's. From the mid-1900s onwards the school was developed. The site itself appeared to be impacted by construction and demolition of structures, use and impacts from hazardous building materials in these former structures, filling for levelling purposes and installation of services, and use of pesticides around site and beneath buildings. These also formed the AEC for the site. Based on the potential contamination sources/AEC identified, and the potential for contamination, further investigation of the contamination conditions was considered to be required via an intrusive investigation in order to quantify potential risks and facilitate estimates to clean up the site, should clean-up be required.
Preliminary (Intrusive) Site Investigation, 2023[4]	The intrusive PSI was undertaken in September 2023. The investigation included a review of existing project information, a site inspection, and soil sampling from five boreholes of which four are within the current site applicable to the DSI (BH2, BH3, BH4 and BH5) (see Figure 2). The boreholes encountered fill materials (i.e. historically imported soil) to depths of approximately 0.4m below ground level (BGL) to 1.5mBGL, underlain by natural clayey alluvial soils. The fill contained inclusions of igneous and ironstone gravel and root fibres. Elevated concentrations of the CoPC were not encountered above the adopted Site Assessment Criteria (SAC) in the soil samples. The investigation did not identified contamination that would preclude the proposed development/use of the site and a trigger for remediation was not identified. However, a DSI was recommended to meet the requirements of NEPM 2023 and the NSW EPA guidelines, and assess whether remediation is required.

[3] JKE, (2023a). *Report to School Infrastructure New South Wales on Preliminary (Desktop) Site Investigation for Potential Additions to Ulladulla High School at 55 South Street, Ulladulla, NSW.* (Ref: E36217PTrpt Ulladulla HS) (referred to as Desktop)

[4] JKE, (2023a). *Report to School Infrastructure New South Wales on Preliminary (Intrusive) Site Investigation for Ulladulla High School Upgrades at 55 South Street, Ulladulla, NSW.* (Ref: E36217PTrpt3 DRAFT Ulladulla HS) (referred to as intrusive PSI)

2.2 Site Identification

Table 2-2: Site Identification

Site Address:	**55 South Street, Ulladulla, NSW**
Lot & Deposited Plan:	Lot 1 in DP595313
Current Land Use:	High school (Year 7 to year 12)
Proposed Land Use:	Continued use as a high school
Local Government Area:	Shoalhaven City Council
Current Zoning:	SP2: Educational Establishment
Site Area (m^2) (approx.):	1,035
Geographical Location (decimal degrees) (approx.):	Latitude: -35.3588016 Longitude: 150.4688589
Site Location Plan:	Appendix A

2.3 Site Location and Regional Setting

The site is located within Ulladulla High School which is located in a mixed use (residential, commercial and infrastructure - education) area of Ulladulla and is bound by South Street to the south, St Vincent Street to the east, Green Street to the north, and Camden Street to the west. The site is located approximately 345m to the south of Millards Creek and approximately 485m to the west of Ulladulla harbour.

The site and wider school property is located within undulating topography defined by low relief hills generally sloping at approximately 5° to 10°. The site itself generally appearing to have been levelled to accommodate the existing development.

The most recent walkover inspection of the site was undertaken by JKE on 20 September 2023. The site formed part of the grass covered playing field in the central west area of the wider school property and two existing demountable classrooms in the east of the site (refer to Figure 1 and Figure 2 in Appendix A).

The site buildings were single storey demountable classrooms, constructed with metal walls and rooves, on brick piers. A concrete path extended along the southern side of the site. The remainder of the site generally comprised grass covered playground/ sports field.

Surface water would be expected to infiltrate the ground surface or flow in keeping with the local topography (i.e. flow to the north-east).

2.4 Surrounding Land Use

The site was within the wider school property and was surrounded by the adjoining areas of the school. The wider school property was surrounded by the following land uses in the immediate surrounds:

- North – Residential properties, Green Street and Ulladulla Public School, St Vincent De Paul retails shop and a Catholic Church;
- South – Residential properties;
- East – Residential properties and commercial properties (including Coles, Aldi, medical offices and other small retail businesses); and
- West – Residential properties.

JKE did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

2.5 Underground Services

The 'Before You Dig Australia' (BYDA) plans were reviewed for the in preparation of this SAQP in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

2.6 Summary of Regional Geology, Soils and Hydrogeology

2.6.1 Regional Geology

Regional geological information was reviewed for the previous investigations. The information indicated that that the site is underlain by Quaternary aged deposits of unconsolidated alluvial gravel, sand, silt and clay with variable humic content; gravels commonly clast supported.

A summary of the subsurface conditions encountered during the intrusive PSI is presented in the following table:

Table 2-3: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all boreholes and extended to depths of approximately 0.4m to 1.5mBGL. The fill typically comprised silty clay with inclusions of igneous and ironstone gravel and root fibres. No odours or staining were recorded in the fill material during field work. No FCF/ suspected asbestos containing material (ACM) was encountered in the fill material during fieldwork.
Natural Soil	Natural clayey soils were encountered beneath the fill material in all boreholes and extended to depths of approximately 0.8m to 4.0mBGL. No odours or staining were recorded in the natural soils during field work.
Bedrock	Siltstone or sandstone bedrock was encountered beneath the natural soils in all locations. No odours or staining were recorded in the bedrock during field work.
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling and a short time after.

2.6.2 Dryland Salinity – National Assessment

Dryland salinity information was reviewed for the previous investigation. There was no dryland salinity national assessment data for the site.

2.6.3 Acid Sulfate Soil (ASS) Risk and Planning

ASS risk maps were reviewed for the previous investigation. The information indicated that:

- According to the risk maps prepared by the Department of Land and Water Conservation (DLWC), the site is not located in an ASS risk area; and
- Shoalhaven Local Environment Plan (LEP) 2014, indicated that the site is located within a Class 5 ASS risk area. Works in a Class 5 risk area that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent Class 1,2,3,4 land.

2.6.4 Hydrogeology

Hydrogeological information presented in the previous investigations indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes fractured or fissured, extensive aquifers of low to moderate productivity. There was a total of three registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 1,600m from the site. This was utilised for water supply purposes;
- All three bores were located over 1,600m cross-gradient to the north, of the site; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 2-3m, underlain by granite or sandstone bedrock. Standing water levels (SWLs) in the bores ranged from 18mBGL to 27mBGL.

The information reviewed indicated that the subsurface conditions at the site are likely to consist of relatively high permeability (alluvial) soils. The potential for viable groundwater abstraction and use of groundwater under these conditions may exist, however, there are no registered groundwater users in close proximity to the site. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur. Use of groundwater is not proposed as part of the development.

Considering the local topography and surrounding land features, JKE anticipate groundwater to flow in a north-easterly direction.

2.7 Receiving Water Bodies

The upper reaches of an unnamed tributary runs in a south-west to north-east direction through the wider school property, to the east/north-east of the site. Millards Creek is located approximately 200m to the north and northern-most point of the wider property. Ulladulla Harbour is located approximately 485m to the east of the site. These water bodies are considered to be potential receptors.

3 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and background/site history site history information. Reference should also be made to the figures attached in the appendices.

3.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) are presented in the following table:

Table 3-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. Fill can also be created from on-site earthworks and can become impacted via on-site activities such as demolition of buildings that contained hazardous building materials such as asbestos and lead paint. The intrusive PSI encountered fill to depths of 0.4m to 1.5mBGL on the site.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use of pesticides – Pesticides may have been used around the site and wider school property.	Heavy metals and OCPs.
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. Hazardous building materials may have also impacted the soils due to the demolition of former buildings/structures. These materials have also been identified within the existing buildings/structures on the wider school property site as per the asbestos register (as summarised in Section 2.1).	Asbestos, lead and PCBs.

3.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 3-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination.

Affected media	Soil has been identified as the potentially affected medium. The potential for groundwater impacts is considered to be relatively low. However, groundwater would need to be considered in the event significant contamination was identified in soil.
Receptor identification	Human receptors include site occupants/users (including adults and older children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users and (though, unlikely) recreational water users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including any proposed landscaped areas), freshwater ecology in the nearby creeks and marine ecology in Ulladulla Harbour.
Potential exposure pathways	Dermal absorption, ingestion and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary/direct contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings. Potential exposure pathways to groundwater (for human receptors) would be via vapour intrusion, or potential primary/secondary contact with groundwater during construction or if groundwater migrates into the creeks and harbour which could be utilised for recreational purposes. Exposure to ecological receptors could also occur in these water bodies.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into proposed buildings (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; • Contact with groundwater during construction activities; and • Migration of groundwater into nearby water bodies, including aquatic ecosystems and recreational water bodies.
Presence of preferential pathways for contaminant movement	None identified at the site.

4 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) have been developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013). The seven-step DQO approach for this project is outlined in the following sub-sections.

The DQO process is validated in part by the Data Quality Assurance/Quality Control (QA/QC) Evaluation. The Data (QA/QC) Evaluation will be summarised in the DSI report.

4.1.1 Step 1 - State the Problem

The intrusive PSI identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the consent authority in exercising its planning functions in relation to the development proposal.

A waste classification is required prior to off-site disposal of excavated soil/bedrock.

4.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the DSI are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?
- Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?
- What is the preliminary waste classification of the fill soils?

4.1.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing relevant environmental data from previous reports;
- Site information, including site observations and site history documentation;
- Sampling of potentially affected media, including soil;
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining;
- Laboratory analysis of soils and fibre cement (if found on/in soils) samples for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

4.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 and will be limited vertically to approximately 0.5-1m into natural ground or prior refusal (spatial boundary). The final depth could depend on site conditions and will be noted in the DSI. At this stage, the sampling is scheduled to be completed in December 2024 (temporal boundary). Areas not accessible for sampling will be noted in the DSI as data gaps.

4.1.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

4.1.5.1 Tier 1 Screening Criteria

The laboratory data will be assessed against relevant Tier 1 screening criteria (referred to as SAC), as outlined in Section 5. Exceedances of the SAC do not necessarily indicate a requirement for remediation or a risk to human health and/or the environment. Exceedances are considered in the context of the CSM and valid SPR-linkages.

Where appropriate, data will be assessed against valid statistical parameters to characterise the data population. This will include calculation and application of mean values and/or 95% upper confidence limit (UCL) values for the data set, with regards to the NEPM (2013) framework and other relevant guidelines made under the CLM Act 1997.

For the DSI, the following decision rules will be considered:

- If all CoPC (with the exception of asbestos) concentrations are below the SAC, then the data will be compared directly to the SAC without statistical analysis;
- For soil data, if any individual CoPC (with the exception of asbestos) concentration is above the SAC, then statistical analysis will be considered based on the sampling plan. This will include calculation of the 95% upper confidence limit (UCL) value for the data set, with regards to the NEPM (2013) framework and other relevant guidelines made under the CLM Act 1997. The UCL will be considered acceptable where the UCL is below the SAC, the standard deviation of the data is less than 50% of the SAC and none of the individual concentrations are more than 250% of the SAC; and
- If asbestos concentrations are encountered above the SAC or in the top 100mm of soil, then asbestos will be deemed a contaminant of concern for remediation purposes.

The intrusive PSI data will be considered for statistical analysis purposes, should this analysis occur.

4.1.5.2 Field and Laboratory QA/QC

Field QA/QC will include analysis of inter-laboratory duplicates (minimum of 5% of primary samples), intra-laboratory duplicates (minimum of 5% of primary samples), and trip spike (for volatiles), trip blank (for selected organic and inorganic compounds) and rinsate (for selected organic and inorganic compounds) samples (one for each medium sampled to assess the adequacy of field practices).

Further details regarding the sampling and analysis undertaken, and the acceptable limits adopted, will be included in the Data Quality (QA/QC) Evaluation presented in the DSI report.

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which will be outlined in the laboratory reports. These criteria are developed and implemented in accordance with the laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, the most conservative concentration reported are to be adopted.

4.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

The PQLs of the analytical methods are to be considered in relation to the SAC to confirm that the PQLs are less than the SAC. In cases where the PQLs are greater than the SAC, a discussion of this is provided.

4.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results will be undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For the DSI, the null hypothesis will be adopted which is that, there is considered to be a complete source-pathway-receptor (SPR) linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis will be adopted for this investigation. Quantitative limits on decision errors will be not established due to the limited number of samples (i.e. <10).

Data Quality Indicators (DQI) for field and laboratory QA/QC samples are defined below. An assessment of the DQI's is to be made in relation to precision, accuracy, representativeness, completeness and comparability.

Field Duplicates

Acceptable targets for precision of field duplicates will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Trip Blanks and Rinsates

Acceptable targets for field blank and rinsate samples in this report will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to typical background concentrations in soils and published drinking water guidelines for waters.

Trip Spikes

Acceptable targets for trip spike samples will be 70% to 130%.

Laboratory QA/QC

The suitability of the laboratory data will be assessed against the laboratory QA/QC criteria. These criteria are developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the typical limits is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics; and
- 60-140% recovery acceptable for organics.

Surrogate Spikes

- 60-140% recovery acceptable for general organics.

Method Blanks

- All results less than PQL.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence will be reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is to be undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, we will adopt the most conservative concentration reported.

4.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the investigation objectives. Adjustment of the investigation design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data will be collected. The sampling plan and methodology are outlined in the following sub-sections.

4.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology proposed for the DSI is outlined in the table below:

Table 4-1: Proposed DSI Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples for the DSI will be collected from four locations as shown on the attached Figure 2. This number of locations (when combined with BH2, BH3, BH4 and BH5 from the intrusive PSI) meets

Aspect	Input
	the minimum sampling density for hotspot identification, as outlined in the NSW EPA Sampling Design Part 1 – Application (2022)[5] contaminated land guidelines.
Sampling Plan	The sampling locations will be placed on a systematic plan with a grid spacing of approximately 16m between sampling location. A systematic plan is considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations (UCLs will only be applied where appropriate and in accordance with the DQOs).
Set-out and Sampling Equipment	Sampling locations will be set out using hand held GPS unit (with an accuracy of ±0.02m). In-situ sampling locations will be checked for underground services by an external contractor prior to sampling. Samples will be collected using a combination of: • Backhoe/excavator. Samples will be obtained from the test pit walls or directly from the bucket by hand. Where sampling occurs from the bucket, JKE will collect samples from the central portion of large soil clods, or from material that is unlikely to have come into contact with the bucket. Depending on site constraints, we may elect to use a spiral auger attachment (300mm in diameter) in some or all locations sampled using the excavator; or • Hand equipment (i.e. hand auger/shovel) in and around the demountable classrooms in areas that are inaccessible for the excavator.
Sample Collection and Field QA/QC	Soil samples will be obtained in accordance with our standard field procedures. Soil samples will be collected from the fill and natural profiles based on field observations. The sample depths will be shown on the logs included in the DSI report. Soil samples for contamination testing will be placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for asbestos analysis will placed in zip-lock plastic bags. During sampling, soil at selected depths will be split into primary and duplicate samples for field QA/QC analysis. The field splitting procedure includes alternate filling of the sampling containers to obtain a representative split sample. Homogenisation of duplicate samples will not occur to minimise the potential for the release of volatile organic compounds.
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp will be used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs will be undertaken on soil samples using the soil sample headspace method. VOC data will be obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records will be maintained for the project. The field screening for asbestos quantification will include the following: • A representative bulk sample (approximately 10L sample, to the extent achievable based on sample return) is to be collected from fill at 1m intervals, or from each distinct fill profile. The quantity of material for each sample may vary based on the return achieved using the auger. The bulk sample intervals will be shown on the test pit logs; • Each sample will be weighed using an electronic scale;

[5] NSW EPA, (2022). *Sampling design part 1 - application.* (referred to as EPA Sampling Design Guidelines 2022)

Aspect	Input
	• Each bulk sample will be passed through a sieve with a 7.1mm aperture and inspected for the presence of fibre cement. If the soil are cohesive in nature, the samples will be subsequently placed on a contrasting support (blue tarpaulin) and inspected for the presence of fibre cement. Any soil clumps/nodules will be disaggregated; • The condition of fibre cement or any other suspected asbestos materials will be noted on the field records; and • If observed, any fragments of fibre cement in the bulk sample will be collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content will be undertaken based on the requirements outlined in Schedule B1 of NEPM (2013), as summarised in Section 5.1. Bulk samples in unpaved areas will be taken from the top 100mm, then each distinct fill profile thereafter, with a minimum of one sample per 1m depth of each fill profile.
Decontami-nation and Sample Preservation	Sampling personnel will use disposable nitrile gloves during sampling activities. Re-usable sampling equipment will be decontaminated between sampling events using a Decon and potable water solution, followed by a rinse in potable water. Soil samples will be preserved by immediate storage in an insulated sample container with ice. On completion of the fieldwork, the samples may be stored temporarily in fridges in the JKE warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

4.3 Laboratory Analysis and Proposed Analytical Schedule

Samples will analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. The laboratory details are provided in the table below:

Table 4-2: Laboratory Details

Samples	Laboratory
All primary samples and field QA/QC samples including intra-laboratory duplicates, trip blanks, trip spikes, field rinsate and shroud samples	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)

For the DSI, an allowance has been made for the following analysis:

- Up to four selected soil samples for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; BTEX; OCP; OPP; PCBs; and asbestos (500ml). This analysis will be targeted at fill soils;
- Up to two soil samples for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; and BTEX. This analysis will generally be targeted at natural soils or rock, however, we may elect to analyse deeper fill samples depending on the conditions;
- One selected FCF, if found on or in soil, analysed for asbestos;

- Targeted toxicity characteristic leachate procedure (TCLP) analysis for selected metals and PAHs for waste classification purposes; and
- Collection and analysis of QA/QC samples (including intra- and inter-laboratory duplicates, trip blank/spike and rinsate).

The soil analysis will generally target the fill soils and the first contact of natural soils. Deeper samples may be analysed based on the results of the shallow soils and site observations. A staged approach to soil sample analysis has been undertaken to allow for targeting areas based on the results of the initial analysis round.

5 SITE ASSESSMENT CRITERIA (SAC)

The following SAC derived from the NEPM 2013 and other guidelines, as discussed in the following sub-sections, will be adopted for the DSI.

5.1 Soil

Soil data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) as outlined below.

5.1.1 Human Health

- Health Investigation Levels (HILs) for a 'public open spaces; secondary schools; and footpaths' exposure scenario (HIL-C);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B) will be adopted as land use type C does not allow for buildings and structures. HSLs will be calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[6]; and
- Asbestos will be assessed against the HSL-C criteria. A summary of the asbestos criteria is provided in the table below:

Table 5-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-C criteria will be adopted for the assessment of asbestos in soil. The SAC adopted for asbestos are derived from the NEPM 2013 and based on the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[7]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.02% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): **% w/w asbestos in soil =** $\frac{\text{**% asbestos content x bonded ACM (kg)**}}{\text{Soil volume (L) x soil density (kg/L)}}$ However, we are of the opinion that the actual soil volume in a 10L bucket varies considerably due to the presence of voids, particularly when assessing cohesive soils. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows (we note that the units have also converted to grams): **% w/w asbestos in soil =** $\frac{\text{**% asbestos content x bonded ACM (g)**}}{\text{Soil weight (g)}}$

[6] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[7] Western Australian (WA) Department of Health (DoH), (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. (referred to as WA DoH 2021)

5.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. The EILs will only be applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene will be increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[8];
- ESLs will be adopted based on the soil type; and
- EILs for selected metals will be calculated based on the most conservative added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[9]. This method is considered to be adequate for the Tier 1 screening.

5.1.3 Management Limits for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) will be considered.

5.1.4 Waste Classification

Data for the waste classification assessment will be assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[10] as outlined in the following table:

Table 5-2: 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; and • 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 must be undertaken 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.

[8] Canadian Council of Ministers of the Environment, (1999). *Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)* (referred to as the Canadian Soil Quality Guidelines)

[9] Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

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

6 DSI REPORTING REQUIREMENTS

A DSI report is to be prepared presenting the results of the investigation, in accordance with the NSW EPA Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (2020)[11].

[11] NSW EPA, (2020). *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines*

7 LIMITATIONS

The report limitations are outlined below:

- This SAQP was developed based on the information available, as documented in this plan. There is always a potential that the proposed investigation will identify contamination impacts (actual or potential) that trigger a need for further investigation;
- 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;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- 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 plan is 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 preparation of this report has been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment 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; and
- 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.

Important Information About This Report

These notes have been prepared by JKE to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors
This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the investigation. If the subject site is sold, ownership of the investigation report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the investigation was undertaken. No person should apply an investigation for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an investigation report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data
Site investigations identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an investigation indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Investigation Limitations
Although information provided by a site investigation can reduce exposure to the risk of the presence of contamination, no environmental site investigation can eliminate the risk. Even a rigorous professional investigation may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Investigations by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an investigation report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Investigation Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the investigation. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the investigation. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete investigation should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site investigation is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site investigation, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

Appendix A: Report Figures

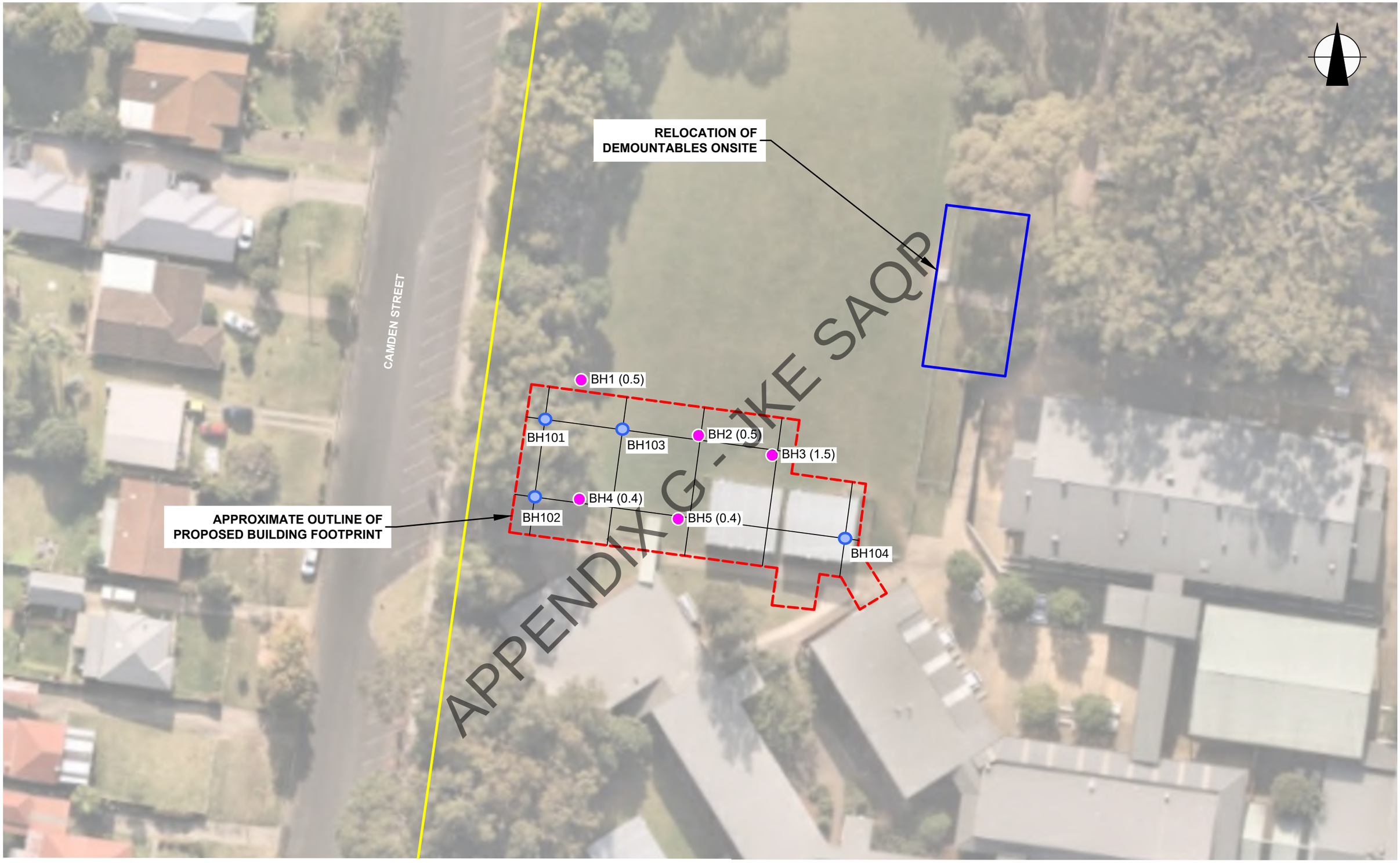
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	55 SOUTH STREET, ULLADULLA, NSW
Project No:	E36217PT
Figure No:	1

JKEnvironments

PLOT DATE: 14/09/2023 12:42:59 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36217PT ULLADULLA HS\CAD\E36217PT-SAQP.DWG



LEGEND

— — —	APPROXIMATE SITE BOUNDARY
———	APPROXIMATE WIDER PROPERTY BOUNDARY
BH1(0.5)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (Intrusive PSI, 2023)
BH101	PROPOSED BOREHOLE LOCATION AND NUMBER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 5 10 15 20 25

SCALE 1:500 @A3 METRES

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

Title: **PROPOSED SAMPLE LOCATION PLAN**

Location: 55 SOUTH STREET, ULLADULLA, NSW

Project No: E36217PT

Figure No: 2

JKEnvironments

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Appendix B: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[12] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[13]. The NEPM (2013) is consistent with these documents.

A. Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection Limit for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations: *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit"* (Keith, 1991).

B. Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD).

C. Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes. Accuracy is typically reported as percent recovery.

D. Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

E. Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;

[12] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[13] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

F. Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

G. Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling, transport and analysis.

H. Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

I. Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

J. Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{\text{(D1 – D2) x 100}}{\text{\{(D1 + D2)/2\}}}$$

Appendix C: Guidelines and Reference Documents

Canadian Council of Ministers of the Environment, (1999). Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)

CRC Care, (2011). Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document

Contaminated Land Management Act 1997 (NSW)

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

NSW EPA, (2014). Waste Classification Guidelines - Part 1: Classifying Waste

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

NSW EPA, (2020). Consultants Reporting on Contaminated Land, Contaminated Land Guidelines

NSW EPA, (2022). *Sampling design part 1 - application*, Contaminated Land Guidelines

National Environment Protection Council (NEPC), (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Olszowy, H., Torr, P., and Imray, P., (1995). Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy (Resilience and Hazards) 2021 (NSW)

Western Australia Department of Health, (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

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Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map Series

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

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