REPORT TO

CAMPBELLTOWN CATHOLIC CLUB

C/- SCOTT CARVER

ON

DETAILED SITE INVESTIGATION

FOR

PROPOSED CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING DEVELOPMENT

AT

3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Date: 16 July 2024

Ref: E36287BLrpt3

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Executive Summary

Campbelltown Catholic Club ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed Campbelltown Catholic Club Independent Living development at 3 Old Menangle Road, Campbelltown, NSW ('the site'). The purpose of the investigation is to make an assessment of site contamination. The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2 attached in the appendices.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed development, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[1] (formerly known as SEPP55).

From the supplied architectural drawings (Ref. 20220099, Drawing No. AD-DA097 to AD-DA103 & AD-DA107, all Revision C) prepared by Scott Carver, we understand the proposed development will include construction of an eight-storey building over three basement levels. Due to the sloping nature of the site (i.e. down to the north-east), excavation will be required to depths of approximately 9.3m below ground level (BGL) at the north-eastern end, and 12mBGL at the south-western end with potentially localised deeper excavations of up to 2m depth, required for any lift-over run pits.

Two ramps will be constructed in the western corner of the proposed basement to provide access to the neighbouring two-level basement to the north-west. An Onsite Detention (OSD) tank will also be installed immediately behind the north-eastern basement wall. On-grade roadways, footpaths, outdoor spaces and landscaped garden areas will surround the proposed building. The existing single storey building (i.e. 'Emily Cottage') located in the eastern corner of the site will be retained. Proposed development plans provided to JKE are included in the appendices.

The primary aim of the DSI was to further characterise the soil and groundwater contamination conditions in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during proposed development works.

The DSI objectives are to:

- Assess the soil and groundwater contamination conditions via implementations of the Sampling Analysis and Quality Plan (SAQP);
- Assess the potential risks posed by contamination to the receptors identified in the Conceptual Site Model (CSM);
- Provide a preliminary waste classification for the in-situ soil;
- Assess whether the site is suitable or can be made suitable (via remediation) for the proposed development, 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 presented in the PSI;
- Refinement of the CSM;
- Design and implementation of a sampling, analysis and quality plan (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 DSI included soil sampling from 13 sample locations and groundwater sampling from two groundwater wells (one well remained dry during the DSI). Bonded asbestos in the form of Asbestos Containing Material (ACM) was encountered during the DSI at the surface in the vicinity of Emily Cottage in the eastern portion of the site. Asbestos in the form of AF/FA (friable) was detected in fill soil at a concentration below the adopted human health-based SAC at one location (TP110) as shown on Figure 3.

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[1] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as SEPP Resilience and Hazards 2021)

All remaining soil samples submitted for analysis reported low soil contaminant concentrations, below the adopted SAC.

Zinc was encountered in groundwater above the ecological SAC. The ecological risks associated with minor detections of zinc in groundwater were assessed to be low.

Based on the Tier 1 risk assessment, potential risks from exposure to asbestos were identified. On this basis, and with due consideration to the data gaps, we recommend preparation of a Remediation Action Plan (RAP) and Asbestos Management Plan (AMP) for the proposed development. Site remediation and validation will be required in accordance with the RAP.

JKE are of the opinion that the site can be made suitable for the proposed development described in Section 1.1 via site remediation/implementation of a RAP and AMP. The RAP will include recommendations for further investigation to address the data gaps outlined in Section 9.3.

Based on the current site layout and in consideration of the site's on-going use as car park and residential property, JKE recommend implementing interim management measures in the areas where there is exposed soil at the surface to mitigate the immediate risks to site users posed by the asbestos contamination identified at the site. This is to include the following measures:

- Undertake an 'emu pick' of the area around Emily Cottage and the residential property at the site for fragments of FCF/suspected ACM at the surface of the site. The pick should be conducted by a suitably licensed asbestos contractor. On completion of the pick, a clearance certificate should be issued by a competent person or NSW Licensed Asbestos Assessor to ensure the area is free of visible asbestos;
- Ensure garden beds or areas of exposed soil are suitably covered with mulch are grass cover;
- Restrict gardening/maintenance activities in the area around Emily Cottage and the residential property until such time as the soil can be remediated and/or the risk of exposure can be eliminated; and
- An AMP for the site should be prepared and implemented. The AMP will provide guidance on management of known asbestos at the site.

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

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Attachments

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**
Above-Ground Storage Tank	**AST**
Before You Dig Australia	**BYDA**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Cis-1,2-dichloroethene	**cis-DCE**
Combined Risk Value	**CRV**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environmental Site Assessment	**ESA**
Fibre Cement Fragment(s)	**FCF**
Finished Floor Level	**FFL**
General Approval of Immobilisation	**GAI**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
Health Screening Level-Site Specific Assessment	**HSL-SSA**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
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**
Perchloroethylene (also known as tetrachloroethene)	**PCE**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCB**
Per-and Polyfluoroalkyl Substances	**PFAS**
Perfluorooctanoic Acid	**PFOA**

Perfluorooctanesulfonic Acid	**PFOS**
Perfluorohexane Sulfonate	**PFHxS**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Relative Level	**RL**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Reduced/Relative Level	**RL**
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**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standing Water Level	**SWL**
Trichloroethene	**TCE**
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**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Vinyl Chloride	**VC**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

Campbelltown Catholic Club ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed Campbelltown Catholic Club Independent Living development at 3 Old Menangle Road, Campbelltown, NSW ('the site'). The purpose of the investigation is to make an assessment of site contamination. The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2 attached in the appendices.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed development, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[2] (formerly known as SEPP55).

A Preliminary Site Investigation (PSI) has previously been prepared for the site by JKE in 2023[3]. A summary of this information has been included in Section 2. This report should be read in conjunction with the PSI report.

1.1 Proposed Development Details

From the supplied architectural drawings (Ref. 20220099, Drawing No. AD-DA097 to AD-DA103 & AD-DA107, all Revision C) prepared by Scott Carver, we understand the proposed development will include construction of an eight-storey building over three basement levels. Due to the sloping nature of the site (i.e. down to the north-east), excavation will be required to depths of approximately 9.3m below ground level (BGL) at the north-eastern end, and 12mBGL at the south-western end with potentially localised deeper excavations of up to 2m depth, required for any lift-over run pits.

Two ramps will be constructed in the western corner of the proposed basement to provide access to the neighbouring two-level basement to the north-west. An Onsite Detention (OSD) tank will also be installed immediately behind the north-eastern basement wall. On-grade roadways, footpaths, outdoor spaces and landscaped garden areas will surround the proposed building. The existing single storey building (i.e. 'Emily Cottage') located in the eastern corner of the site will be retained. Proposed development plans provided to JKE are included in the appendices.

1.2 Aims and Objectives

The primary aim of the DSI was to further characterise the soil and groundwater contamination conditions in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during proposed development works.

The objectives were to:

- Assess the soil and groundwater contamination conditions via implementations of the Sampling Analysis and Quality Plan (SAQP);

[2] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as SEPP Resilience and Hazards 2021)

[3] JKE, (2023). *Report to Campbelltown Catholic Club on Preliminary Site Investigation for Proposed Campbelltown Catholic Club Independent Living at 3 Old Menangle Road, Campbelltown, NSW.* (referred to as PSI report)

- Assess the potential risks posed by contamination to the receptors identified in the Conceptual Site Model (CSM);
- Provide a preliminary waste classification for the in-situ soil;
- Assess whether the site is suitable or can be made suitable (via remediation) for the proposed development, from a contamination viewpoint; and
- Assess whether further intrusive investigation and/or remediation is required.

1.3 Scope of Work

The investigation was undertaken generally in accordance with a JKE proposal (Ref: EP59795BLrev1) of 15 February 2024 and written acceptance from the client of 3 May 2024. The scope of work included the following:

- Review of site information, including background and site history information presented in the PSI;
- Refinement of the CSM;
- Design and implementation of a sampling, analysis and quality plan (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], other guidelines made under or with regards to the Contaminated Land Management Act (1997)[5] and SEPP Resilience and Hazards 2021. 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)

2 SITE INFORMATION

2.1 Preliminary Site Investigation (PSI)

The client commissioned JKE to undertake a PSI at the site for the proposed independent living development in 2023. The purpose of the investigation was to make a preliminary assessment of site contamination.

The PSI included a review of historical information and sampling from two boreholes. Based on the scope of work undertaken for the PSI, JKE identified fill material; historical agricultural use; use of pesticides; and hazardous building material as potential contamination sources and/or areas of environmental concern (AEC).

Bonded asbestos in the form of Fibre Cement Fragments (FCF) was encountered at the surface in the western portion of the site (shown on Figures 2 and 3 of the PSI report). All other contaminants of potential concern (CoPC) concentrations in soil were below the adopted site assessment criteria (SAC).

Based on the potential contamination sources/AEC identified, and the potential for site contamination, the PSI recommended preparation of a DSI to further characterise site contamination conditions and establish whether the site needs to be remediated to render the site suitable for the proposed development. The PSI also recommended a hazardous building materials survey be undertaken prior to demolition of the buildings, and an asbestos clearance certificate be obtained following demolition.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Campbelltown Catholic Club Limited
Site Address:	3 Old Menangle Road, Campbelltown, NSW
Lot & Deposited Plan:	Part of Lot 10 in DP1134526 Lots 3 and 4 in DP193040 Lot 61 in DP997095
Current Land Use:	Residential and commercial
Proposed Land Use:	Residential (Independent Aged Care)
Local Government Area:	Campbelltown City Council
Current Zoning:	MU1: Mixed Use
Site Area (m^2) (approx.):	4,500m^2
RL (AHD in m) (approx.):	70-73
Geographical Location (decimal degrees) (approx.):	Latitude: -34.073776 Longitude: 150.807578
Site Location Plan:	Figure 1

Sample Location Plan:	Figure 2
Site Contamination Plan:	Figure 3

2.3 Site Location and Regional Setting

The site is located in a predominantly commercial and residential area of Campbelltown and is bound by Camden Road along the north to north-eastern boundary, and Old Menangle Road along the southern boundary. The site is located approximately 75m to the west of Fishers Ghost Creek which is a tributary to the larger Bow Bowing Creek.

2.4 Topography

The regional topography is characterised by a north facing hillside that falls towards Bow Bowing Creek. The site is located near the toe of the hillside and slopes down towards the north and north-east at a gradient of approximately 2-3°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.5 Summary of Site Inspection

A walkover inspection of the site was undertaken by JKE for the PSI on 19 October 2023 and subsequently for the DSI on 20 May 2024. The site conditions remained generally similar to the observations made during the JKE inspection undertaken for the PSI, with key observations summarised below:

- The south-west portion of the site was occupied by a residential property (lots 3 & 4 in DP193040) with a single storey house and surrounding grassed lawns. The central and north-east portions of the site (part of Lot 10 in DP1134526) was used for the storage of shipping containers in the south and also made up a small area of the adjoining Catholic Club car par in the north, which was partially paved with concrete and asphaltic concrete (AC) at the surface. The south-eastern corner of the site was occupied by the heritage site 'Emily House' (Lot 61 in DP997035) which consisted of the heritage cottage surrounded by grassed and vegetated lawns;
- All on site buildings appeared in good condition and were mostly of brick, sandstone and timber construction. Potential asbestos containing fibre cement lining was identified to the external eave and awning linings of the residential building in the south-west corner. The roof tiles of the original portion of Emily House were also noted as potentially containing asbestos;
- No waste or chemicals were noted to be stored on site at the time of the inspection;
- The site overall appears to have been cut and/or filled to compensate for the overall slope of the site and create a level surface for the existing developments;
- Several fibre cement fragments (FCF) were identified at the ground surface within the vicinity of the heritage cottage. The fragments were presumed to be associated with the building's roof tiles. A representative sample (FCF101) was collected for asbestos analysis;
- Surface water was presumed to flow in sympathy with the overall gradient of the site towards the north and north-east. Drainage pits were noted in the surrounding car park to the west and north that were connected to the local stormwater system;

- Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds; and
- Native and exotic shrubs and large trees were present across the site, in ground and within small landscaped areas. No signs of stress or dieback were identified.

2.6 Surrounding Land Use

During the site inspection, JKE observed the following land uses in the immediate surrounds:
- North – Campbelltown Catholic Club carpark and Camden Road. Kashigaya Park beyond;
- South – Old Menangle Road and the Campbelltown Arts Centre;
- East – Camden Road and carpark; and
- West – Campbelltown Catholic Club carpark and visitors' information centre.

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

2.7 Underground Services

The 'Before You Dig Australia' (BYDA) plans were reviewed for the investigation 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.

2.8 Summary of Site History

A time line summary of the historical land uses and activities is presented in the table below. The information presented in the table is based on a weight of evidence, including assessment of the site history documentation and observations made by JKE during the previous investigations.

Year(s)	Potential Land Use / Activities
1922-1955	• Residential onsite land use; • Demolition and construction activity onsite; and • Surrounding predominantly residential, grazing and/or agricultural land uses.
1955-1970	• Significant residential construction onsite; • Additional residential development and construction of the original Campbelltown Catholic Club building off-site; and • Clearing of agricultural land off-site.
1970-1994	• Construction of existing northern carpark onsite; and • Ongoing development to the Campbelltown Catholic Club offsite.
1994-2005	• Ongoing development to the Campbelltown Catholic Club offsite.
2005-present day	The site and immediate surrounds remained generally unchanged to the present day.

3 SUMMARY OF GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

A review of the regional geological information indicated that the site is underlain by Alluvium, which typically consists of unconsolidated alluvial clay, silt, sand and gravel deposits. The land immediately to the south of the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite.

3.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an ASS risk area according to the risk maps prepared by the Departments of Land and Water Conservation.

ASS information reviewed from the PSI indicated that the site is not located within an ASS risk area.

3.3 Hydrogeology and Groundwater

Hydrogeological information reviewed from the PSI indicated:

- The subsurface conditions around the site are expected to consist of moderate to high permeability (alluvial) soils overlying relatively deep bedrock. Abstraction and use of groundwater may be viable under these conditions; however, the use of groundwater is not proposed as part of the development. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur;
- The nearest registered bore was located approximately 580m from the site and was registered for monitoring purposes. No nearby bores (i.e. within 2,000m) were registered for domestic or irrigation purposes; and
- Considering the local topography and surrounding land features, JKE anticipate groundwater to flow towards the north or north-east.

3.4 Receiving Water Bodies

The site location and regional topography indicates that excess surface water flows have the potential to enter Fishers Ghost Creek located approximately 75m to the east of the site, which is tributary to the larger Bow Bowing Creek. This water body is considered to be a potential receptor.

4 CONCEPTUAL SITE MODEL

4.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 4-1: 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. The boreholes drilled for the JKE DSI investigation encountered fill ranging in depth from approximately 0.45mBGL to 0.8mBGL.	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.
Historical agricultural use – The site appears to have been used for grazing and market garden purposes. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/ demolition of various structures. Irrigation pipes made from asbestos cement may also be associated with this AEC.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos JKE note that OCPs only became commercially available in the 1940s. Prior to this time pesticides were predominantly heavy metal compounds.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site, or may have been imported in fill. Bonded asbestos in the form of FCF was encountered at the surface in the western portion of the site during the PSI, and within the vicinity of Emily Cottage. FCF sample locations encountered during the DSI are shown on the attached Figure 3 and the PSI Figure 3 in the appendices.	Asbestos, lead and PCBs

JKE note that herbicides have not been included as CoPC as herbicides are not commonly found at residual concentrations likely to pose a risk to human health or the environment (NSW DEC 2005, *Guidelines for Assessing Former Orchards and Market Gardens*).

4.2 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 4-2: CSM

Potential mechanism for contamination	Potential mechanisms for contamination include: • Fill material – importation of impacted material, 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material); • Historical agricultural use – 'top-down' and spills (e.g. application of pesticides, refuelling or repairing machinery, and other activities at the ground surface level); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); and • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas).
Affected media	Soil and groundwater have been identified as potentially affected media. The potential for groundwater impacts is considered to be relatively low. However, groundwater will need to be considered as the proposed development is likely to intercept the groundwater table as part of the basement excavation.
Receptor identification	Human receptors include site occupants/users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in Fisher Ghost Creek.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption 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 and basements.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed basement and/or building (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; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation.

5 SUMMARY SAMPLING, ANALYSIS AND QUALITY PLAN

JKE prepared a stand-alone SAQP for the DSI which is attached in the appendices. 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 1.2;
- Soil samples were obtained from a total of 13 locations across the site to meet the project objectives, and were placed on an approximate 20m grid-based sampling to meet the minimum sampling density for hotspot identification, as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[6] as shown on the attached Figure 2;
- Soil samples from the boreholes were obtained using a drill rig equipped with spiral flight augers (150mm diameter) and soil samples from the test pits were obtained using a 6-tonne excavator and directly from the excavator bucket;
- There were two monitoring wells (MW1 and MW2) installed by JKG during a previous geotechnical investigation in 2023. One monitoring well was installed in BH101 (MW101) as part of the DSI. The well was positioned to establish background groundwater conditions at the site, as shown on Figure 2;
- The monitoring wells were developed on 20 May 2024;
- The wells were allowed to recharge for seven days after development. Groundwater samples for the DSI were obtained from MW1 and MW2 on 27 May 2024. MW101 was not sampled as there was insufficient water observed during sampling; and
- The field monitoring records and calibration data are attached in the appendices.

5.1 Deviations to the SAQP

The following deviations to the SAQP are noted:

- Some sample locations were moved off the proposed grid-based sampling plan due to the presence of underground services, refer to Figure 2 for the actual sampling locations;
- The fill was not penetrated in TP113 due to the presence of sandstone boulders in fill;
- Bulk samples for asbestos quantification could not be obtained during soil sampling from all fill profiles due to the low sample volume return, or due to the presence of thin/narrow fill profiles. However, 500mL samples were obtained from all sampling locations where fill was encountered for asbestos analysis at the laboratory;
- Groundwater was not encountered in MW101 and therefore groundwater samples were not obtained from this location as part of the DSI; and
- Due to a scheduling error, the inter-laboratory soil duplicate was analysed by the primary laboratory (resulting in two intra-laboratory soil duplicates). The primary sample for duplicate SDUP101 was not scheduled in the first round of analysis, and was subsequently scheduled in report 351818-B. These are discussed in further detail in the appendices.

Please refer to the SAQP attached in the appendices for further information.

[6] NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

5.2 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 5-1: 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	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	351818, 351818-A, 351818-B & 352349
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	MFE0589

6 SITE ASSESSMENT CRITERIA (SAC)

The SAC were derived from the NEPM 2013 and other guidelines as discussed in the following sub-sections and reflect the SAC established in the SAQP. 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.

6.1 Soil

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

6.1.1 Human Health

- Health Investigation Levels (HILs) for a 'residential with minimal opportunity for soil access' exposure scenario (HIL-B);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B). HSLs were 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)[7]; and
- Asbestos will be assessed against the HSL-B criteria. A summary of the asbestos criteria is provided in the table below:

Table 6-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-B 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)[8]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.04% 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): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$ 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):

[7] 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*

[8] 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 = $\frac{\textbf{\% asbestos content x bonded ACM (g)}}{\text{Soil weight (g)}}$

6.1.2 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[9];
- 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)[10]. This method is considered to be adequate for the Tier 1 screening.

6.1.3 Management Limits for Petroleum Hydrocarbons

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

6.1.4 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[11] as outlined in the following table:

Table 6-2: 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:

[9] 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)

[10] 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

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

Category	Description
	• That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

6.2 Groundwater

Groundwater data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[12]. Environmental values for the DSI include aquatic ecosystems, and human-health risks in non-use scenarios (vapour intrusion).

6.2.1 Human Health

- The NEPM (2013) HSLs are not applicable for this project as the proposed basement will intersect groundwater. On this basis, JKE have undertaken a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater. The assessment included selection of alternative Tier 1 criteria that are considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria are based on the following:
  - Australian Drinking Water Guidelines 2011 (updated 2021)[13] for BTEX compounds;
  - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[14] for petroleum hydrocarbons. We have conservatively adopted the value of 100µg/L for TRH F1 and F2;
  - USEPA Region 9 screening levels for naphthalene (threshold value for tap water); and
  - The use of the laboratory PQLs for other contaminants where there are no Australian guidelines.
- The ADWG 2011 will be multiplied by a factor of 10 to assess potential risks associated with incidental -type exposure to groundwater (e.g. with seepage water in the basement). These have been deemed as 'recreational' SAC.

6.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of fresh water species will be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[15]. The 99% trigger values will be adopted where required to account for bioaccumulation. Low

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[12] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination.*

[13] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

[14] World Health Organisation (WHO), (2008). *Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality* (referred to as WHO 2008)

[15] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

and moderate reliability trigger values will also be adopted for some contaminants where high-reliability trigger values don’t exist.

7 RESULTS

7.1 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.

7.2 Subsurface Conditions

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

Table 7-1: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic Concrete (AC)/Concrete/Brick pavement was encountered at the surface in BH101, BH102, BH103, BH104, BH105 and BH109 with a thickness of between 0.05mBGL and 0.16mBGL.
Fill	Fill was encountered at the surface or beneath the pavement in all locations and extended to depths of approximately 0.3mBGL to 1.1mBGL. TP113 was terminated in the fill at a maximum depth of approximately 1.1mBGL. The fill typically comprised silty clay, silty sand or clayey sandy gravel with inclusions of igneous gravel, sandstone gravel, ironstone gravel, ash, slag and building rubble (asphalt, bricks, concrete, glass, tile fragments). Odours or staining were not encountered in the fill during drilling.
Natural Soil	Natural silty clay soil was encountered in all locations beneath the fill, with the exception of TP113 that was terminated in fill. The natural soil extended to depths of between approximately 0.7mBGL to 1.5mBGL.
Bedrock	Siltstone bedrock was encountered beneath the natural soil and extended to the termination depths of the boreholes.
Groundwater	Groundwater seepage was encountered at the base of TP113 at a depth of approximately 1.1mBGL. The remain sample locations remained dry on completion of drilling and a short time after.

7.3 Field Screening

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

Table 7-2: 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. PID results ranged from 0ppm to 0.5ppm, which indicates a lack of PID detectable VOCs.

Aspect	Details
Bulk Screening for Asbestos	The bulk field screening results are summarised in the attached report Table S5. All results were below the SAC. FCF was encountered at the fill surface as discussed in this report.
Groundwater Depth & Flow	Groundwater seepage was encountered at the base of TP113 at a depth of approximately 1.1mBGL. The remaining sample locations were dry during and a short time after completion. Groundwater monitoring wells were installed in BH1, BH2 and BH101. Groundwater monitoring wells were developed after installation on 20 May 2024 and groundwater was measured at depths of approximately 4.15mBGL (MW1) and 2.29mBGL (MW2), MW101 was dry. Groundwater was sampled on 27 May 2024 and groundwater was measured at depths of approximately 4.55mBGL (MW1), 2.13mBGL (MW2) and MW101 remained dry. The groundwater wells were not surveyed, therefore groundwater RLs were not calculated for the DSI.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 6.37 to 7.67; - EC ranged from 1591µS/cm to 7740µS/cm; - Eh ranged from 60mV to 1098mV; and - DO ranged from 0.3ppm to 4.4ppm. The PID readings in the monitoring well headspace recorded during sampling ranged from 0.1ppm in MW1 to 3.2ppm in MW2.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling.

7.4 Soil Laboratory Results

The soil laboratory results were assessed against the SAC presented in Section 6.1. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

7.4.1 Human Health and Environmental (Ecological) Assessment

Table 7-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	20	11	0	0	-
Cadmium	20	0.7	0	NSL	-
Chromium (total)	20	66	0	0	-
Copper	20	93	0	0	-
Lead	20	460	0	0	-
Mercury	20	0.4	0	NSL	-

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Nickel	20	70	0	0	-
Zinc	20	310	0	0	-
Total PAHs	20	3.8	0	NSL	-
Benzo(a)pyrene	20	0.54	NSL	0	-
Carcinogenic PAHs (as BaP TEQ)	20	0.8	0	NSL	-
Naphthalene	20	<0.1	0	NSL	-
DDT+DDE+DDD	14	<0.1	0	NSL	-
DDT	14	<0.1	NSL	0	-
Aldrin and dieldrin	14	<0.1	0	NSL	-
Chlordane	14	<0.1	0	NSL	-
Heptachlor	14	<0.1	0	NSL	-
Chlorpyrifos (OPP)	14	<0.1	0	NSL	-
PCBs	14	<0.1	0	NSL	-
TRH F1	20	<25	0	0	-
TRH F2	20	74	0	0	-
TRH F3	20	280	0	0	
TRH F4	20	120	0	0	
Benzene	20	<0.2	0	0	
Toluene	20	<0.5	0	0	
Ethylbenzene	20	<1	0	0	
Xylenes	20	<1	0	0	
Asbestos (in soil) (%w/w)	14	ACM AF/FA	0 0	NA	Chrysotile asbestos as AF/FA was detected below the human-health based SAC of 0.001%w/w within fill sample TP110 (0-0.1) (refer to Figure 3).

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Asbestos in fibre cement	1	Detected	1	NSL	FCF101 was found to contain Chrysotile and Amosite asbestos fibres.

Notes:

N: Total number (primary samples)

NSL: No set limit

NL: Not limiting

7.4.2 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Section 6.1.4. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 7-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Arsenic	20	0	0	-
Cadmium	20	0	0	-
Chromium	20	0	0	-
Copper	20	NSL	NSL	-
Lead	20	5	0	Lead concentrations exceeded the CT1 criterion in five fill samples collected from TP107 (0-0.1m), TP108 (0-0.1m), TP110 (0-0.1), TP112 (0-0.1) and TP113 (0-0.1m). The maximum lead concentration was 460mg/kg.
Mercury	20	0	0	-
Nickel	20	2	0	Nickel concentrations exceeded the CT1 criterion in three fill samples collected from BH101 (0.16-0.3m), BH109 (0.03-0.2m) and lab triplicate of primary fill sample TP111 (0-0.1m). The maximum nickel concentration was 70mg/kg.
Zinc	20	NSL	NSL	-
TRH (C_6-C_9)	20	0	0	-
TRH (C_{10}-C_{36})	20	0	0	-
BTEX	20	0	0	-
Total PAHs	20	0	0	-
Benzo(a)pyrene	20	0	0	-

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
OCPs & OPPs	14	0	0	-
PCBs	14	0	0	-
Asbestos	14	-	-	Asbestos was detected in the fill soil sample collected from TP110 (0-0.1) and within the fibre cement sample FCF101.

N: Total number (primary samples)

NSL: No set limit

Table 7-5: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	N	N > TCLP Criteria	Comments
Lead	4	0	The four primary fill samples with the highest lead concentrations above the CT1 criterion were analysed for TCLP lead.
Nickel	2	0	The two primary fill samples with nickel concentrations above the CT1 criterion were analysed for TCLP nickel.

N: Total number (primary samples)

7.5 Groundwater Laboratory Results

The groundwater laboratory results were assessed against the SAC presented in Section 6.2. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

Table 7-6: Summary of Groundwater Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	3	<1	0	0	-
Cadmium	3	<0.1	0	0	-
Chromium (total)	3	<1	0	0	-
Copper	3	<1	0	0	-
Lead	3	<1	0	0	-
Mercury	3	<0.05	0	0	-
Nickel	3	7.8	0	0	-
Zinc	3	24	0	1	One elevated concentration of zinc above the ecological criterion was encountered in MW2, with a maximum concentration of 26µg/L identified in the inter-laboratory duplicate (WDUP102) of sample MW2.

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
Total PAHs	3	<0.1	0	0	-
Benzo(a)pyrene	3	<0.1	0	0	-
Naphthalene	3	<0.1	0	0	-
TRH F1	3	<10	0	NSL	-
TRH F2	3	<50	0	NSL	-
TRH F3	3	<100	NSL	NSL	-
TRH F4	3	<100	NSL	NSL	-
Benzene	3	<1	0	0	-
Toluene	3	<1	0	0	-
Ethylbenzene	3	<1	0	0	-
m+p-Xylene	3	<2	0	0	-
o-Xylene	3	<1	0	0	-
Total Xylenes	3	<2	0	0	-
pH	3	7.7	0	0	-
EC	3	1600	0	0	-

Notes:

^: Primary samples

N: Total number

NSL: No set limit

NL: Not limiting

8 PRELIMINARY WASTE CLASSIFICATION ASSESSMENT

8.1 Preliminary Waste Classification of Fill

Based on the results of the DSI, and at the time of reporting, the fill material is assigned a preliminary classification of **General Solid Waste (non-putrescible) containing Special Waste (asbestos)**, for off-site disposal purposes.

The DSI and historical investigations have identified sporadic occurrences of asbestos on and in fill. The management and classification of waste will need to be carefully considered and planned for in the context of the proposed development. Any waste generated from the areas where asbestos has been found cannot be reassessed/re-classified to exclude the 'special waste (asbestos)' classifications. However, in areas where asbestos has not been found to date, further characterisation of the soils and waste classification assessment could be used to establish whether the fill in these areas contains asbestos.

Confirmatory waste classification must occur after demolition and prior to any off-site disposal of waste. The anticipated waste quantities should also be confirmed at that time and documented in the final waste classification report(s).

8.2 Preliminary Classification of Natural Soil and Bedrock

Based on the scope of work undertaken for this DSI, and at the time of reporting, JKE are of the opinion that the natural soil and bedrock at the site is likely to meet the definition of **VENM** for off-site disposal or re-use purposes. However, as the overlying fill in some areas is impacted by asbestos, confirmation of the VENM classification must occur following removal of the overlying fill.

Confirmatory waste classification must occur after demolition and removal of the overlying fill, and prior to any off-site disposal of waste. The anticipated waste quantities should also be confirmed at that time and documented in the final waste classification report(s).

9 DISCUSSION

9.1 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.

9.1.1 Soil

9.1.1.1 Asbestos

Asbestos in the form of bonded FCF/ACM was encountered at the surface in the eastern portion the site during DSI and sampled as FCF101 (see Figure 3). Bonded FCF/ACM was also encountered at the surface in the western/central portion of the site adjacent the existing residential building, which was removed as part of the PSI. The FCF in the eastern portion of the site appeared to be from damaged or deteriorated asbestos cement roof tiles of Emily Cottage (FCF101). The FCF were considered to be non-friable as they were in good condition and could not be crushed or pulverised to powder using hand pressure. As the ACM was encountered at the surface, there is a potential to generate airborne asbestos fibres and for there to be a complete SPR linkage under the current site configuration. FCF101 and associated FCF around Emily Cottage is located around the building perimeter. It is presumed that this area is only disturbed intermittently for gardening/maintenance purposes. Hence there is unlikely to be an unacceptable risk during day-to-day site use where the areas are not disturbed, but the risk of exposure to asbestos would increase during gardening/maintenance.

JKE note that there was a detection of AF/FA (friable) in one sample location TP110 (0-0.1m) below the SAC. Asbestos occurrences at such low concentrations are unlikely to pose an unacceptable risk to site receptors, while soil disturbance does not occur.

JKE considered the sources of asbestos contamination are likely to be from historically imported fill material, damaged/deteriorated asbestos building materials on the existing building at the site, or remnants from historical demolition activities.

The potential for generating airborne asbestos fibres and a complete SPR linkage will increase during disturbance of soil containing AF/FA (i.e. during the proposed development works at the site). These risks will need to be managed during construction so they remain low and acceptable. Further sampling as part of the remediation works will be required to better define the nature and extent of asbestos contamination at the site. It is possible that the occurrence of AF/FA is associated with the ACM. However, it is noted that TP110 was located some distance from FCF101, so the occurrence of friable sources of asbestos cannot be ruled out as a widespread issue at in fill.

9.1.1.2 Other CoPC

Other CoPC in fill were generally report at very low concentrations or at concentrations that were below the PQLs. Detections of pesticides and PCBs were not encountered and this is broadly consistent with previous investigation findings at the site. These CoPC must be considered further in the building footprints after demolition occurs as risks in these areas have not been assessed.

9.1.2 Groundwater

9.1.2.1 Heavy metals

Elevated concentrations of zinc above the ecological SAC were encountered in the groundwater sampled from all MW2. JKE considers that the elevated zinc results are likely to be indicative of regional groundwater background concentrations rather than on on-site contamination source. Risks from groundwater are expected to be low and acceptable on the provision that any groundwater during construction dewatering is appropriately treated and managed for off-site disposal.

9.1.2.2 Other CoPC

All remaining CoPC including TRH/BTEX were below the SAC and/or the laboratory PQLs. These findings are considered to indicate that there is unlikely to be a significant or widespread groundwater contamination issue at the site.

9.2 Decision Statements

The decision statements are addressed below:

Are any results above the SAC?

Yes. As noted in Section 9.1.

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

Potential human-health risks associated with the disturbance of soil containing asbestos exist. Risks to site receptors under the current site configuration were assessed to be low. Additional sampling, remediation (and management) will be required so that risks remain low throughout construction and in the context of the proposed development.

Is remediation required?

It is considered that remediation will be required to address the contamination identified at the site. A Remediation Action Plan (RAP) and Asbestos Management Plan (AMP) will need to be prepared and implemented.

Is the site characterisation sufficient to provide adequate confidence in the above decisions?

Yes, the characterisation provides adequate confidence that remediation will be required.

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

JKE is of the opinion the site can be made suitable for the proposed development via remediation and implementation of a suitable RAP and AMP.

9.3 Data Gaps

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

Table 9-1: Data Gap Assessment

Data Gap	Assessment
Groundwater flow direction not confirmed	Based on the site history and the results reported, the potential for groundwater contamination to pose a risk to the receptors is considered to be low. Although the groundwater flow direction was not established, the site is small and sampling occurred from three wells which provided adequate spatial coverage. Additional work to address this data gap is not recommended.
Limited soil sampling undertaken within building footprint	Only limited soil sampling was undertaken within the building footprint due to access constraints. This is primarily a concern with regards to the finalisation of the waste classification as the majority of this area will be excavated to construct the proposed basement. Additional work to address this data gap will be outlined as part of the RAP.
Asbestos soil sampling density below minimum guideline density for sites where asbestos is "known" to be present. This triggers a need to sample at x2 the minimum NSW EPA sampling density.	Asbestos has been identified at the site within the fill soil and at the surface. Soil sampling for asbestos sampling undertaken from borehole and limited test pit sampling (i.e. a small representation of fill soil) which only disturbs small volumes of soil. Recommendations for additional soil sampling will be included in the RAP and will form part of the site validation requirements.

10 CONCLUSIONS AND RECOMMENDATIONS

The DSI included soil sampling from 13 sample locations and groundwater sampling from two groundwater wells (one well remained dry during the DSI). Bonded asbestos in the form of ACM was encountered during the DSI at the surface in the vicinity of Emily Cottage in the eastern portion of the site. Asbestos in the form of AF/FA was detected in fill soil at a concentration below the adopted human health-based SAC at one location (TP110) as shown on Figure 3.

All remaining soil samples submitted for analysis reported low soil contaminant concentrations, below the adopted SAC.

Zinc was encountered in groundwater above the ecological SAC. The ecological risks associated with minor detections of zinc in groundwater were assessed to be low.

Based on the Tier 1 risk assessment, potential risks from exposure to asbestos were identified. On this basis, and with due consideration to the data gaps, we recommend preparation of a RAP and AMP for the proposed development. Site remediation and validation will be required in accordance with the RAP.

JKE are of the opinion that the site can be made suitable for the proposed development described in Section 1.1 via site remediation/implementation of a RAP and AMP. The RAP will include recommendations for further investigation to address the data gaps outlined in Section 9.3.

JKE are of the opinion that there is currently no requirement to report the contamination to the NSW EPA under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[16]. This is to be further evaluated as the project proceeds.

10.1 Interim Management of Asbestos Contamination

Based on the current site layout and in consideration of the site's on-going use as car park and residential property, JKE recommend implementing interim management measures in the areas where there is exposed soil at the surface to mitigate the immediate risks to site users posed by the asbestos contamination identified at the site. This is to include the following measures:

- Undertake an 'emu pick' of the area around Emily Cottage and the residential property at the site for fragments of FCF/suspected ACM at the surface of the site. The pick should be conducted by a suitably licensed asbestos contractor. On completion of the pick, a clearance certificate should be issued by a competent person or NSW Licensed Asbestos Assessor to ensure the area is free of visible asbestos;
- Ensure garden beds or areas of exposed soil are suitably covered with mulch are grass cover;
- Restrict gardening/maintenance activities in the area around Emily Cottage and the residential property until such time as the soil can be remediated and/or the risk of exposure can be eliminated; and
- An AMP for the site should be prepared and implemented. The AMP will provide guidance on management of known asbestos at the site.

[16] NSW EPA, (2015). *Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997* (referred to as Duty to Report Contamination)

11 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

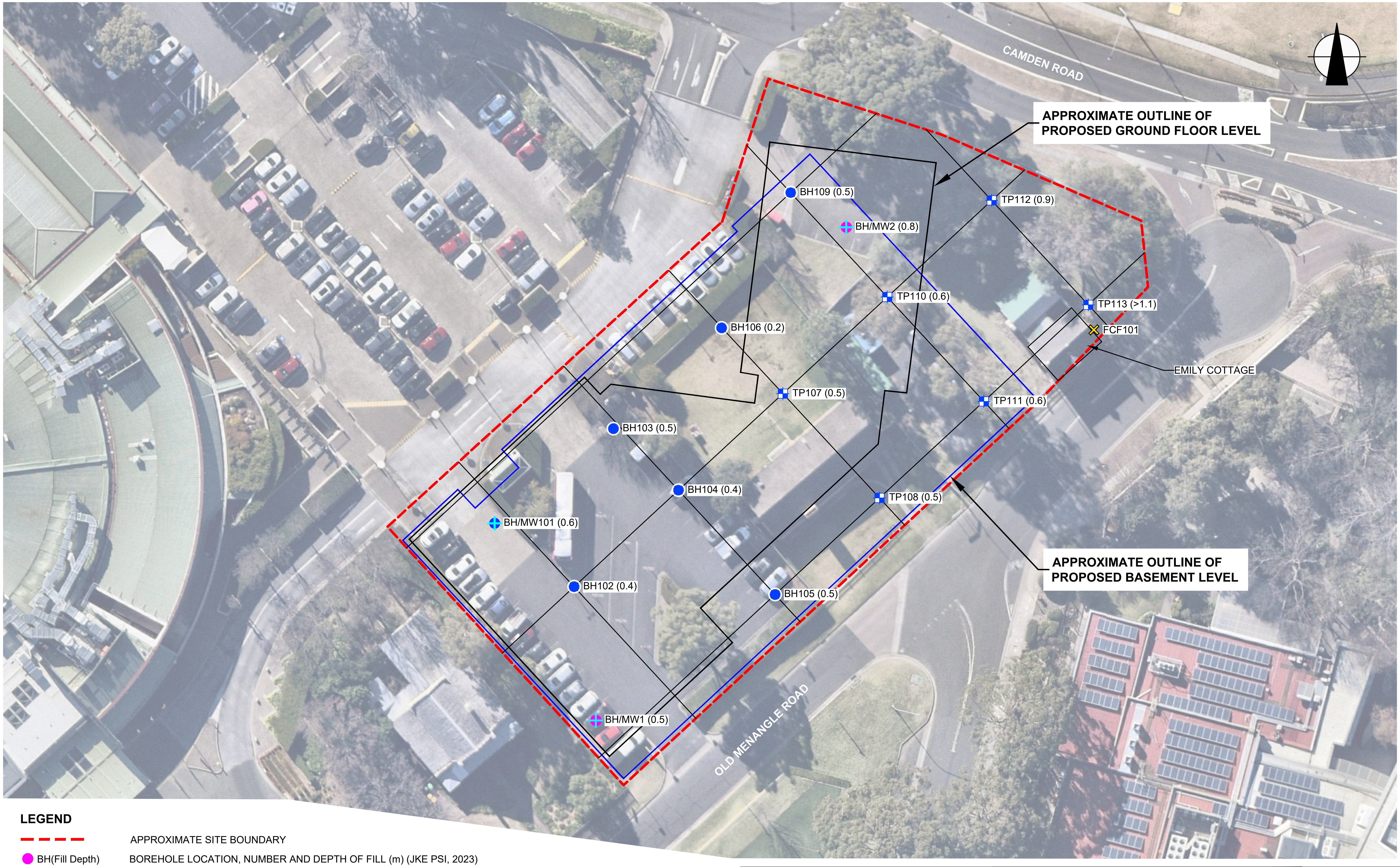
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW
Project No: E36287BL	Figure No: 1

JKEnvironments

PLOT DATE: 16/11/2023 1:32:55 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
BH102	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
BH/MW101	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
TP104	TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)

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: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Project No: E36287BL

Figure No: 2

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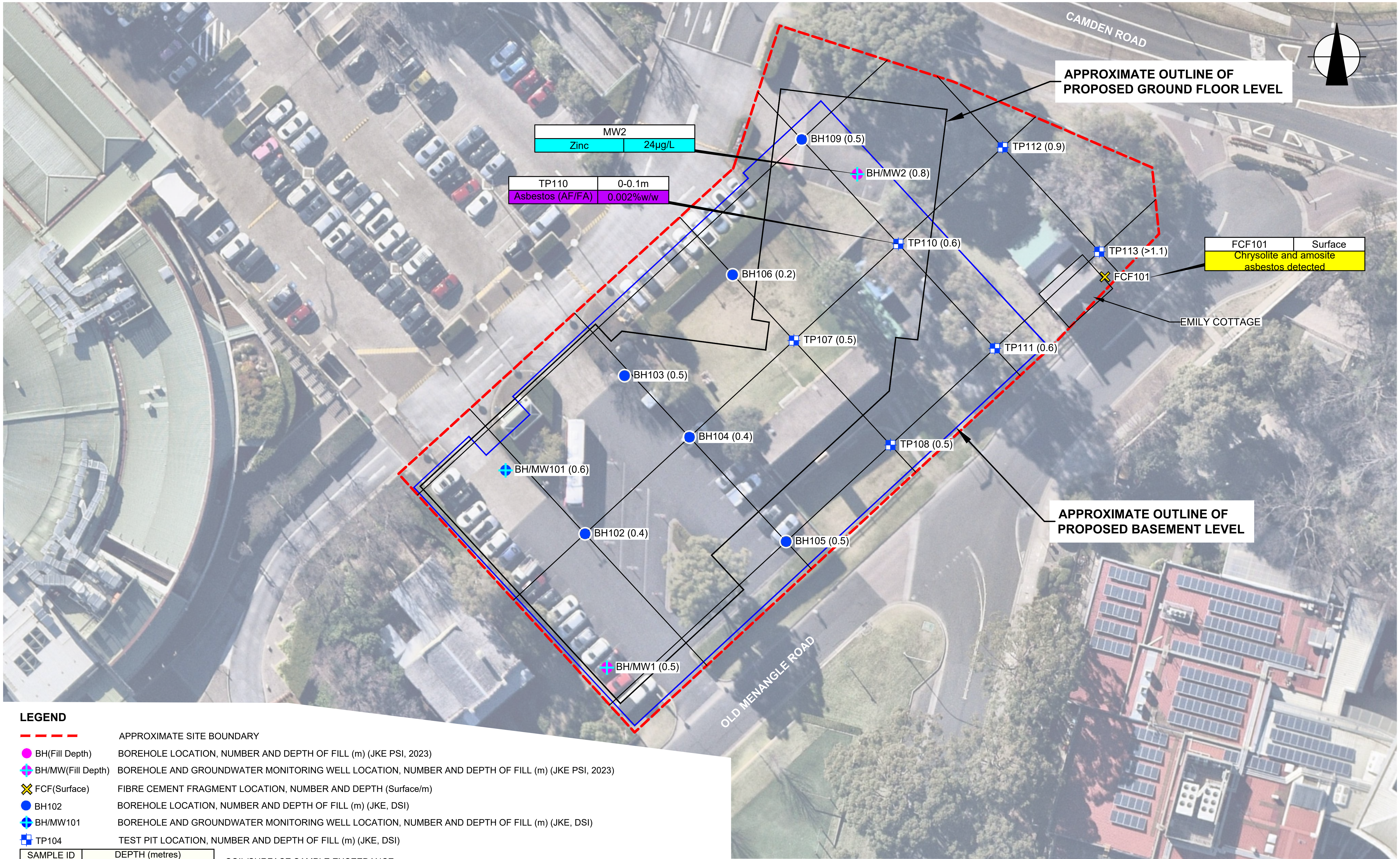
PLOT DATE: 4/07/2024 1:46:23 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
BH102	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
BH/MW101	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
TP104	TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
SAMPLE ID / DEPTH (metres) / CHEMICAL / CONCENTRATION	SOIL/SURFACE SAMPLE EXCEEDANCE
SAMPLE ID / - / CHEMICAL / CONCENTRATION (µg/L)	GROUNDWATER SAMPLE EXCEEDANCE
(yellow)	SOIL/SURFACE CONTAMINATION ABOVE SAC
(purple)	ASBESTOS DETECTED
(cyan)	GROUNDWATER CONTAMINATION ABOVE SAC

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: **SAC EXCEEDANCE PLAN**

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Project No: E36287BL

Figure No: 3

JKEnvironments

PLOT DATE: 4/07/2024 1:56:19 PM DWG FILE: K:\5C EIS JOBS\36000's\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG

Appendix B: Site Information and Site History

Proposed Development Plans

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

[Print Date] 24/11/2023 6:05:14 PM

History

[Rev#]	[Description]	[Date]
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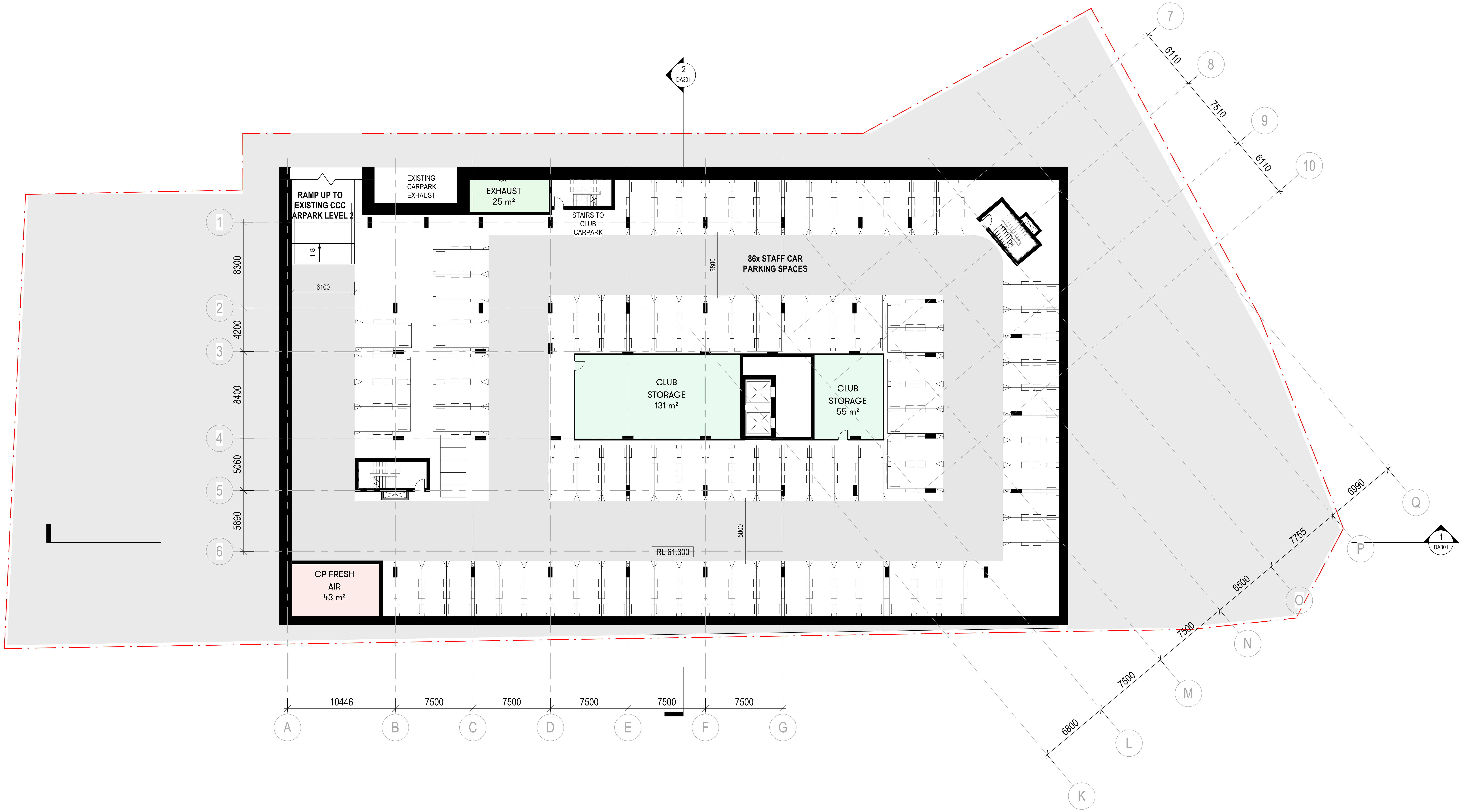
D	FOR INFORMATION	24.11.2023



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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

Bar Scale 1:200 — 0 2 4 6 8 10 m

[Scale] 1 : 200 @ A1

GA PLAN - BASEMENT 3

[Ref] 20220099 [Dwg No] AD-DA097 [Rev] D

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

[Print Date] 24/11/2023 5:59:43 PM

History

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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - BASEMENT 2

[Ref] 20220099 [Dwg No] AD-DA098 [Rev] D

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

[Print Date] 24/11/2023 5:59:45 PM

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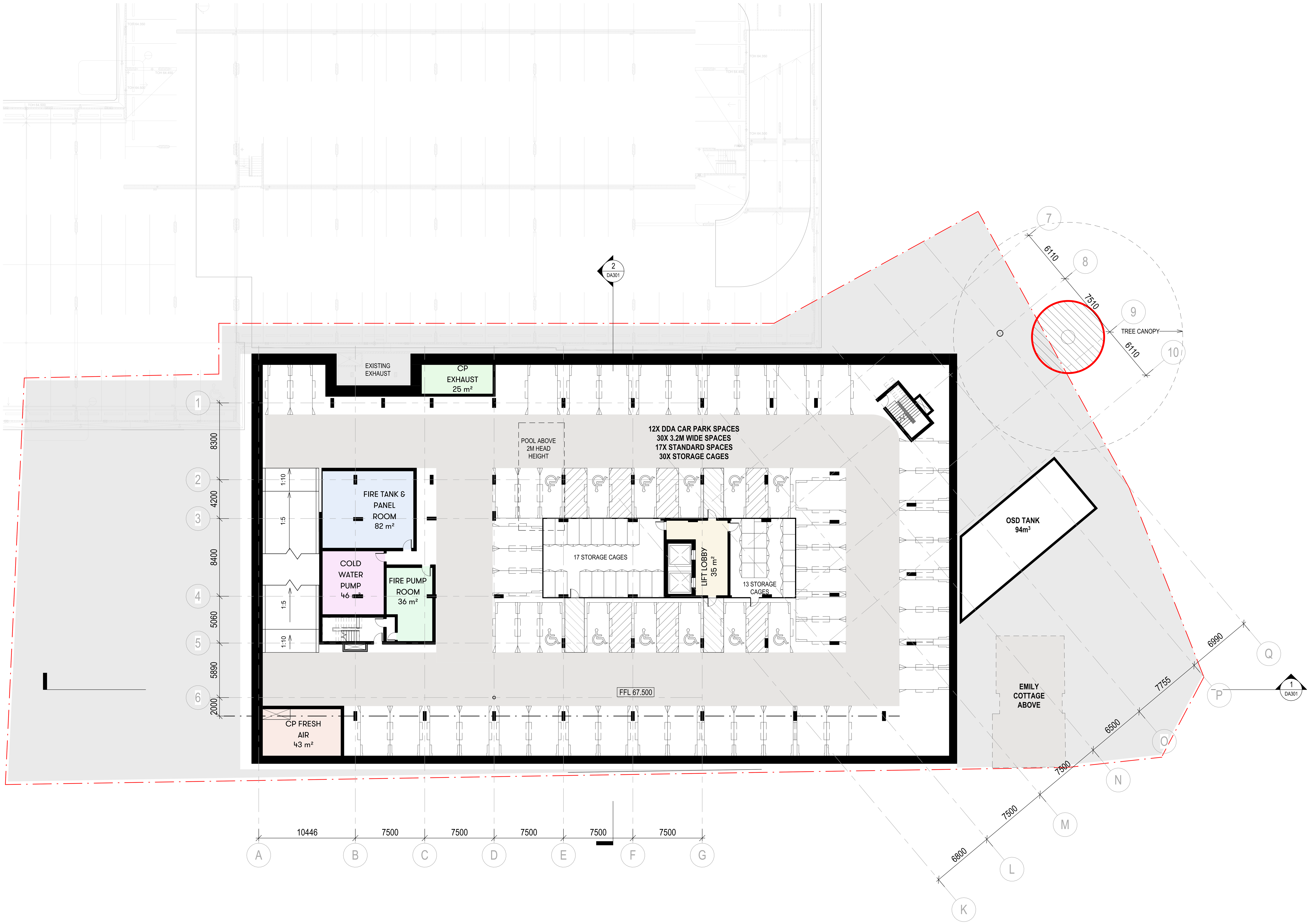

[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

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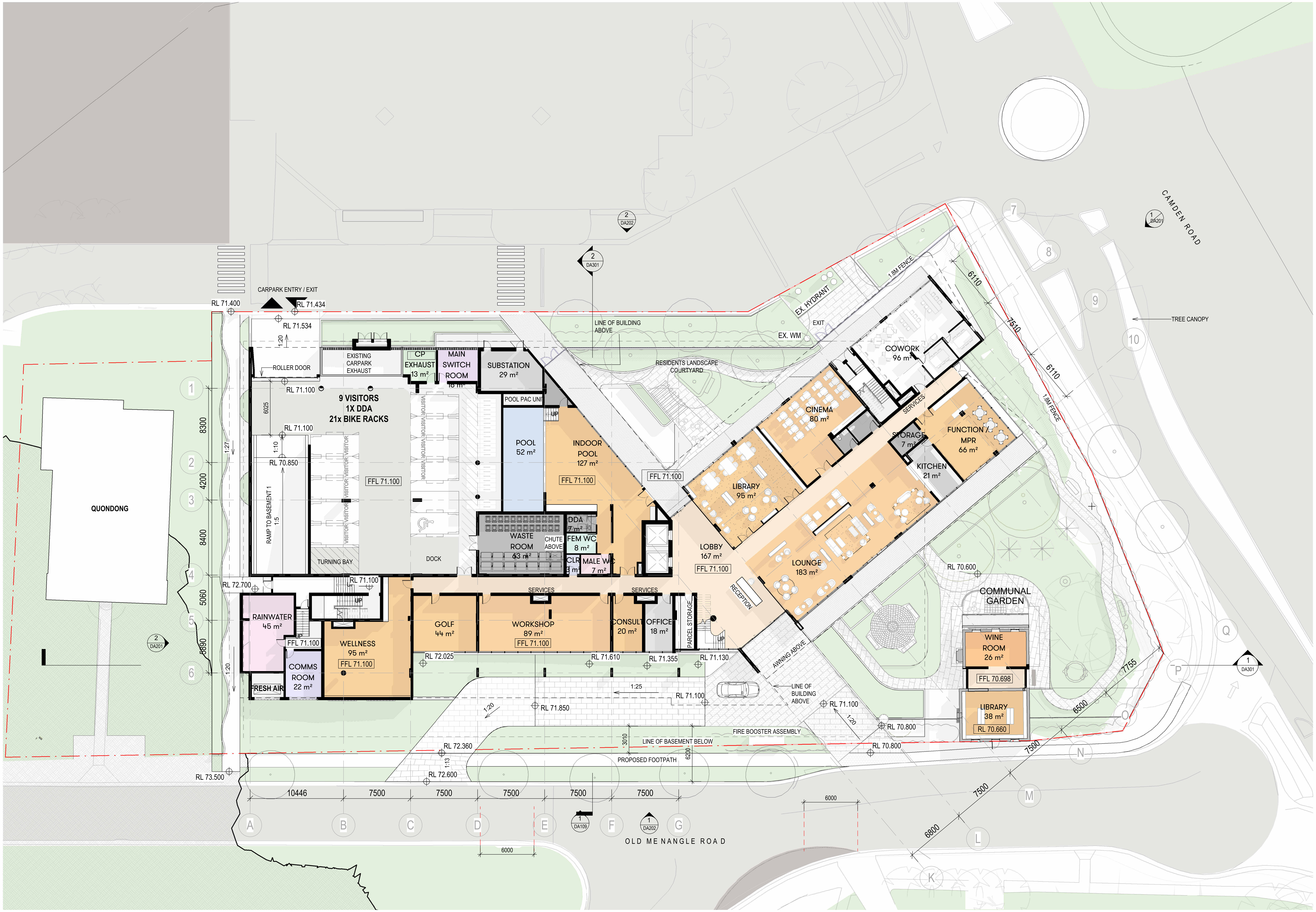
www.scottcarver.com.au +61 2 9957 3988

Bar Scale 1:200 0 2 4 6 8 10 m

[Scale] 1 : 200 @ A1

GA PLAN - BASEMENT 1

[Ref] 20220099 [Dwg No] AD-DA099 [Rev] D



[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - GROUND FLOOR

[Ref] 20220099 [Dwg No] AD-DA100 [Rev] D

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

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D	FOR INFORMATION	24.11.2023

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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

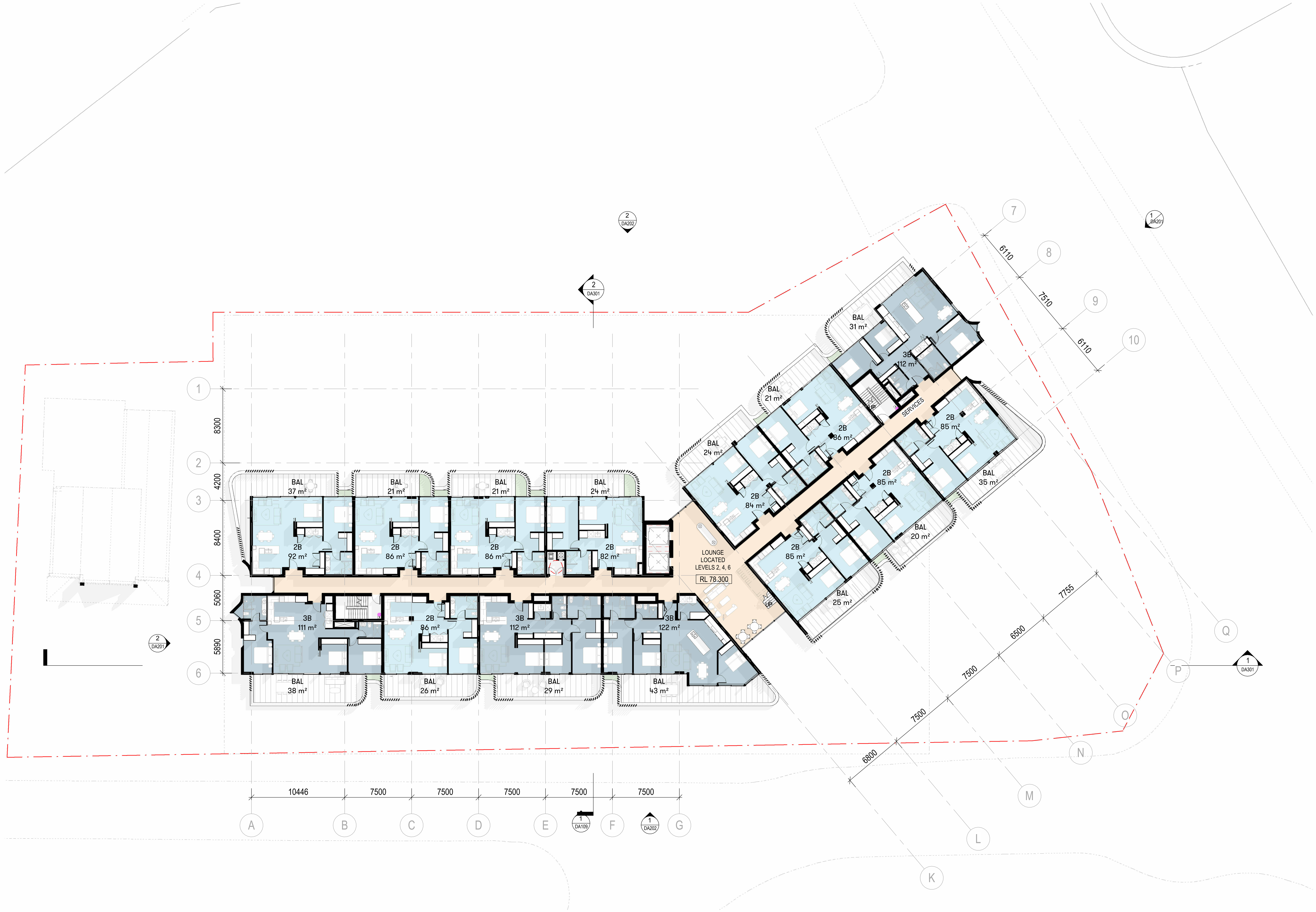
[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - LEVEL 1

[Ref] 20220099 [Dwg No] AD-DA101 [Rev] D



[Status] Preliminary

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[File] 20220099-AB-DA001.rvt

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C	FOR INFORMATION	10.11.2023
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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - LEVEL 2, 4 & 6

[Ref] 20220099 [Dwg No] AD-DA102 [Rev] D

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

[Print Date] 24/11/2023 6:00:50 PM

History

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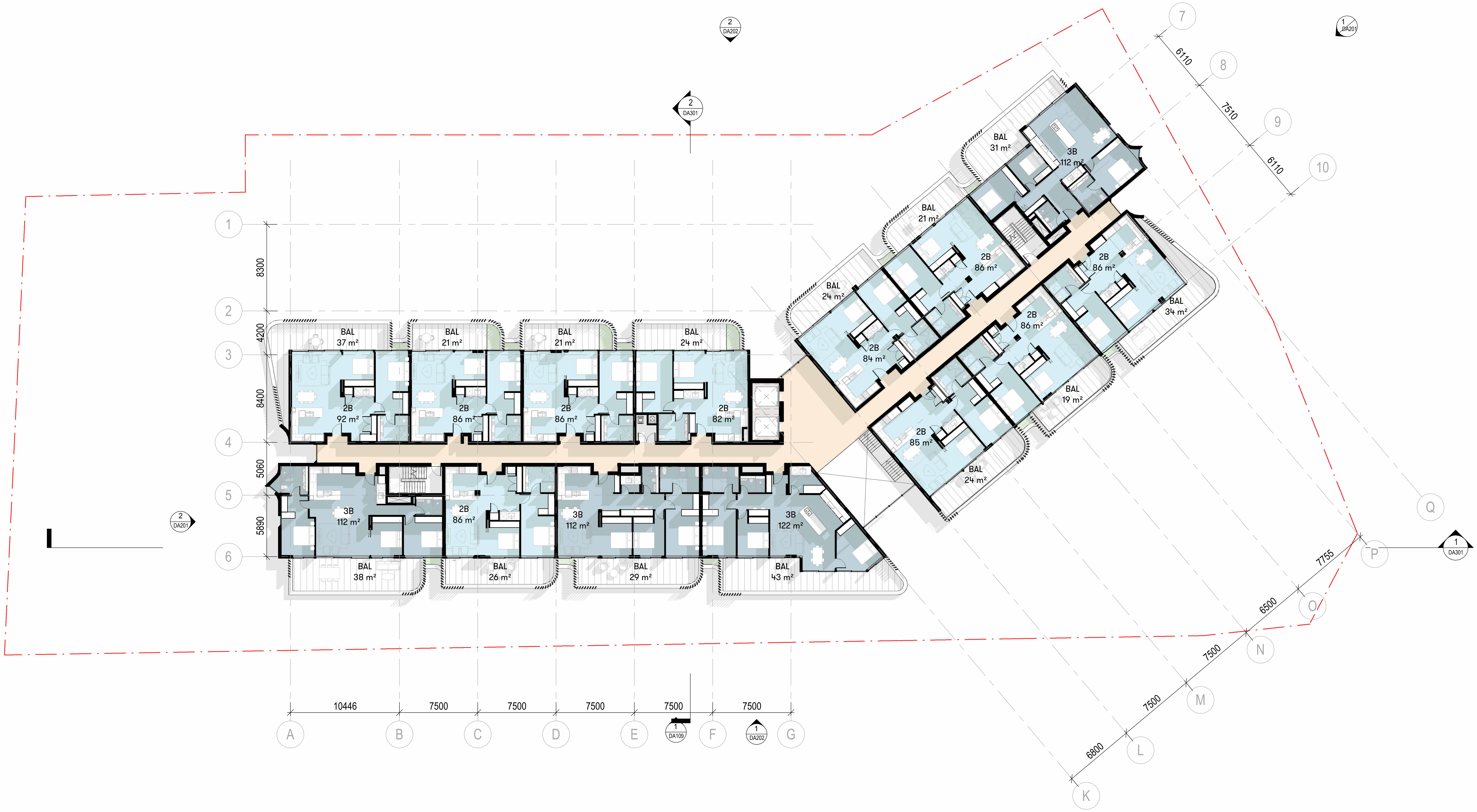
B	FOR INFORMATION	24.11.2023



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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - LEVEL 3 & 5

[Ref] 20220099 [Dwg No] AD-DA103 [Rev] B

[Status] Preliminary
Doug Southwell /7362
[File] 20220099-AB-DA001.rvt
[Print Date] 24/11/2023 6:00:57 PM
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C	FOR INFORMATION	10.11.2023
D	FOR INFORMATION	24.11.2023

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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - LEVEL 7

[Ref] 20220099 [Dwg No] AD-DA107 [Rev] D

[Status] Preliminary

Doug Southwell /7362

[File] 20220099-AB-DA001.rvt

[Print Date] 24/11/2023 6:01:10 PM

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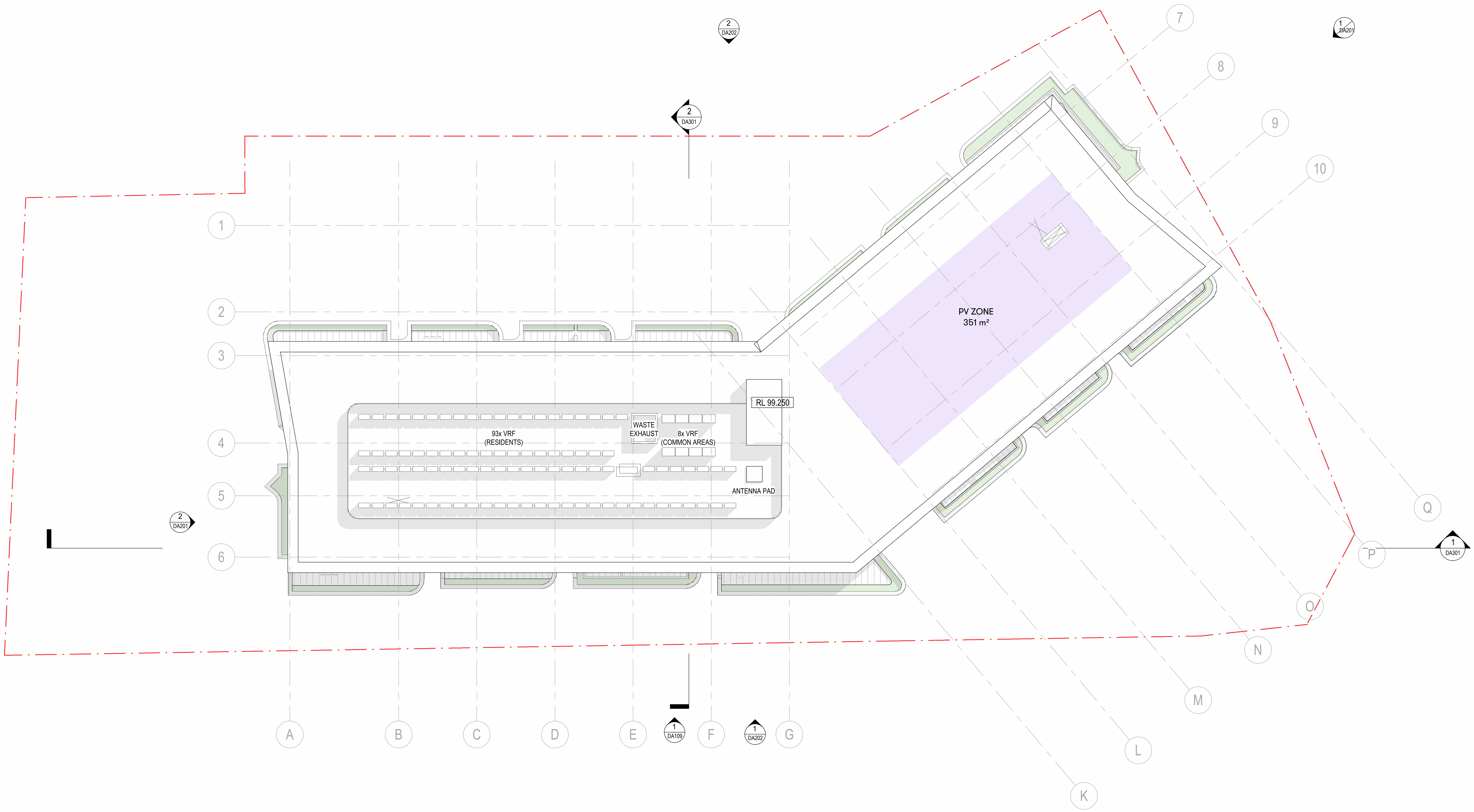

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[Project] CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

[Client] Campbelltown Catholic Club

0 2 4 6 8 10 m
Bar Scale 1:200

[Scale] 1 : 200 @ A1

GA PLAN - ROOF LEVEL

[Ref] 20220099 [Dwg No] AD-DA108 [Rev] A

JKE PSI Summary Information

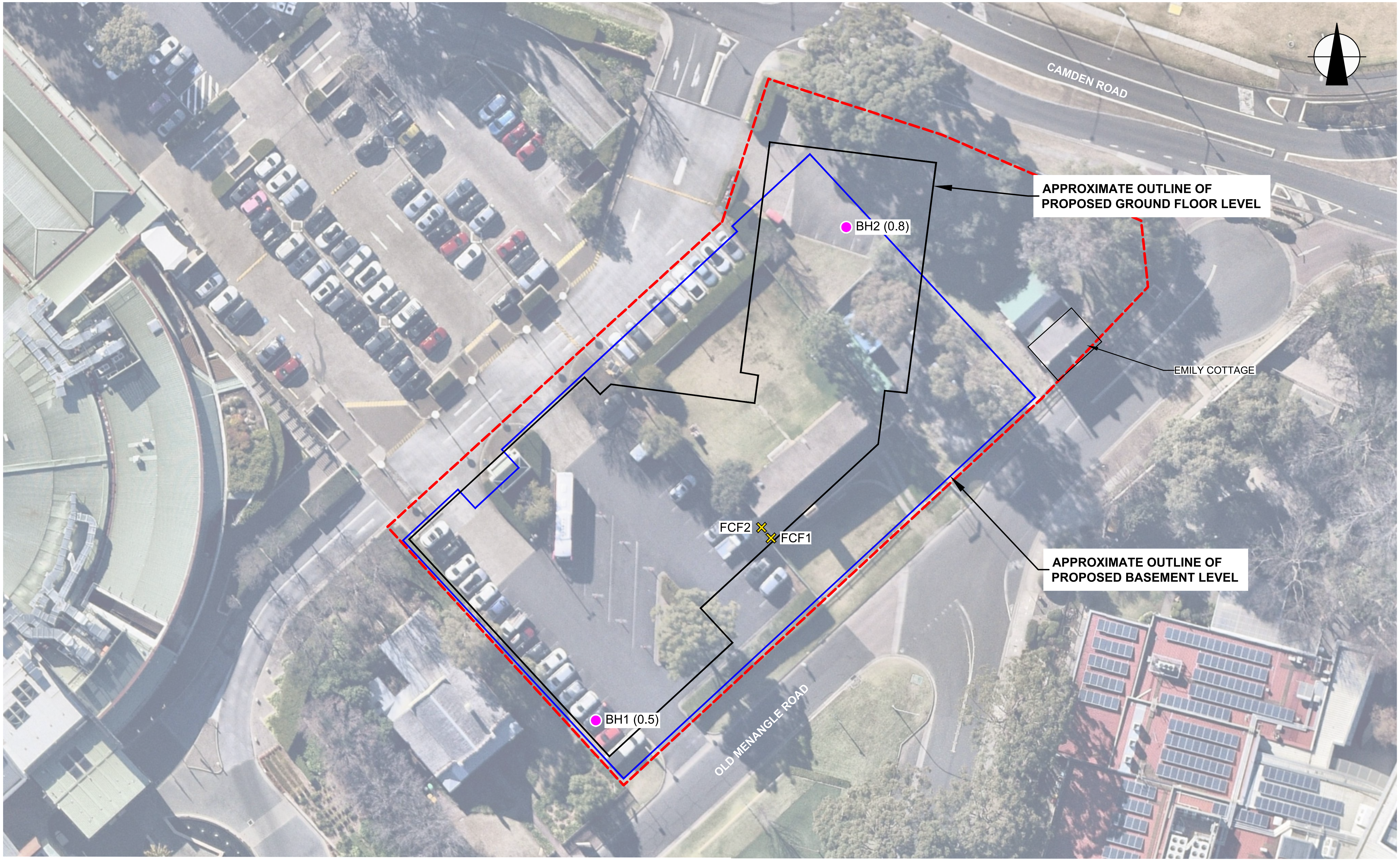
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW
Project No:	E36287BL
Figure No:	1

JKEnvironments

PLOT DATE: 16/11/2023 1:32:55 PM DWG FILE: K:\5C EIS JOBS\36000's\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)

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: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Project No: E36287BL

Figure No: 2

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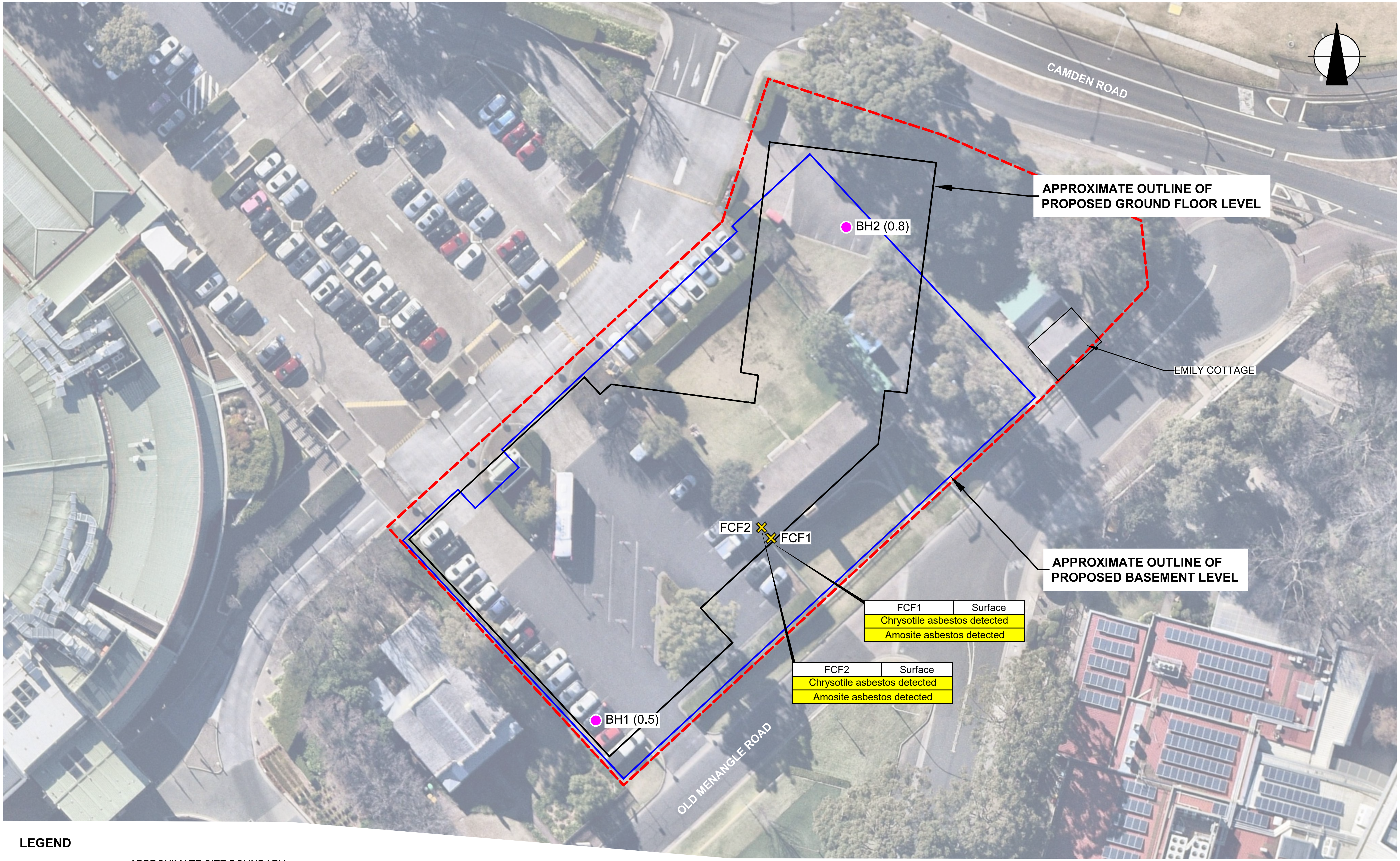
PLOT DATE: 16/11/2023 1:33:04 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
SAMPLE ID / DEPTH (metres) / CHEMICAL / CONCENTRATION	SOIL/SURFACE SAMPLE EXCEEDANCE
(yellow box)	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK

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: **SAC EXCEEDANCE PLAN**

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Project No: E36287BL

Figure No: 3

JKEnvironments

PLOT DATE: 16/11/2023 1:33:15 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
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
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
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)
PQL:	Practical Quantitation Limit
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
SSA:	Site Specific Assessment
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
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).

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 high traffic have been quoted).

QA/QC Table:

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

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-A: 'Residential with garden/accessible soils; children's day care centers; preschools; and primary schools'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)		
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos	TOTAL PCBs	ASBESTOS FIBRES
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)			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0.35-0.45	F: Gravelly sand	<4	<0.4	**5**	**2**	<1	<0.1	**1**	**2**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH1 - [LAB_DUP]	0.35-0.45	F: Gravelly sand	<4	<0.4	**3**	**2**	<1	<0.1	<1	**2**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH1	0.5-0.6	Silty clay	**6**	<0.4	**16**	**35**	**22**	<0.1	**9**	**27**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0.3-0.4	F: Silty gravelly sand	**8**	<0.4	**23**	**18**	**34**	<0.1	**16**	**37**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH2	0.6-0.8	F: Silty clay	**6**	<0.4	**13**	**28**	**21**	<0.1	**9**	**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
BH2	1.7-1.95	Silty clay	**6**	<0.4	**10**	**29**	**23**	<0.1	**10**	**46**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP1	-	F: Gravelly sand	<4	<0.4	**3**	**3**	<1	<0.1	<1	**2**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP2	-	F: Silty gravelly sand	**9**	<0.4	**18**	**16**	**50**	<0.1	**16**	**52**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP2 - [LAB_DUP]	-	F: Silty gravelly sand	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FCF1	Surface	FCF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF2	Surface	FCF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			8	8	8	8	8	8	8	8	9	9	6	6	6	6	6	6	6	6	6	5
Maximum Value			9	<PQL	23	35	50	<PQL	16	52	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected

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

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**								
BH1	0.35-0.45	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
BH1 - [LAB_DUP]	0.35-0.45	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
BH1	0.5-0.6	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.2
BH2	0.3-0.4	F: Silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH2	0.6-0.8	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH2	1.7-1.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP1	-	F: Gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP2	-	F: Silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP2 - [LAB_DUP]	-	F: Silty gravelly sand	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	-
Total Number of Samples					8	9	8	8	8	8	8	5
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	1.2

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
BH1	0.35-0.45	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1 - [LAB_DUP]	0.35-0.45	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1	0.5-0.6	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	0.3-0.4	F: Silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	0.6-0.8	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	1.7-1.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP1	-	F: Gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP2	-	F: Silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP2 - [LAB_DUP]	-	F: Silty gravelly sand	0m to <1m	Sand	NA	110	NA	NA	NA	NA	NA

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**				
BH1	0.35-0.45	Coarse	<25	<50	<100	<100
BH1 - [LAB_DUP]	0.35-0.45	Coarse	<25	<50	<100	<100
BH1	0.5-0.6	Coarse	<25	<50	<100	<100
BH2	0.3-0.4	Coarse	<25	<50	<100	<100
BH2	0.6-0.8	Coarse	<25	<50	<100	<100
BH2	1.7-1.95	Coarse	<25	<50	<100	<100
SDUP1	-	Coarse	<25	<50	<100	<100
SDUP2	-	Coarse	<25	<50	<100	<100
SDUP2 - [LAB_DUP]	-	Coarse	NA	<50	<100	<100
Total Number of Samples			8	9	9	9
Maximum Value			<PQL	<PQL	<PQL	<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)
BH1	0.35-0.45	Coarse	700	1000	2500	10000
BH1 - [LAB_DUP]	0.35-0.45	Coarse	700	1000	2500	10000
BH1	0.5-0.6	Coarse	700	1000	2500	10000
BH2	0.3-0.4	Coarse	700	1000	2500	10000
BH2	0.6-0.8	Coarse	700	1000	2500	10000
BH2	1.7-1.95	Coarse	700	1000	2500	10000
SDUP1	-	Coarse	700	1000	2500	10000
SDUP2	-	Coarse	700	1000	2500	10000
SDUP2 - [LAB_DUP]	-	Coarse	NA	1000	2500	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		4,400	3,300	4,500	6,300	100	14,000	4,500	12,000	1,400	
Site Use		**RESIDENTIAL WITH ACCESSIBLE SOIL- DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH1	0.35-0.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.4**
BH1 - [LAB_DUP]	0.35-0.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
BH1	0.5-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.2**
BH2	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH2	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH2	1.7-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP1	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP2	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP2 - [LAB_DUP]	-	NA	<50	<100	<100	NA	NA	NA	NA	NA	-
Total Number of Samples		8	9	9	9	8	8	8	8	8	5
Maximum Value		<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	1.2

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

TABLE S5
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-A: Residential with garden/accessible soils; children's day care centers; preschools; and primary schools

LABORATORY DATA													
Date Sampled	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											**0.01**	**0.001**
19/10/2023	335882	BH1	0.35-0.45	914.58	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
20/10/2023	335882	BH2	0.3-0.4	813.77	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
20/10/2023	335882	BH2	0.6-0.8	542.49	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	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.35-0.45	F: Gravelly sand	Coarse	NA	NA	NA	<4	**5**	**2**	<1	**1**	**2**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH1 - [LAB_DUP]	0.35-0.45	F: Gravelly sand	Coarse	NA	NA	NA	<4	**3**	**2**	<1	<1	**2**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH1	0.5-0.6	Silty clay	Coarse	NA	NA	NA	**6**	**16**	**35**	**22**	**9**	**27**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	0.3-0.4	F: Silty gravelly sand	Coarse	NA	NA	NA	**8**	**23**	**18**	**34**	**16**	**37**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	0.6-0.8	F: Silty clay	Coarse	NA	NA	NA	**6**	**13**	**28**	**21**	**9**	**35**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	1.7-1.95	Silty clay	Coarse	NA	NA	NA	**6**	**10**	**29**	**23**	**10**	**46**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP1	-	F: Gravelly sand	Coarse	NA	NA	NA	<4	**3**	**3**	<1	<1	**2**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP2	-	F: Silty gravelly sand	Coarse	NA	NA	NA	**9**	**18**	**16**	**50**	**16**	**52**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP2 - [LAB_DUP]	-	F: Silty gravelly sand	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<50	<100	<100	NA	NA	NA	NA	<0.05
Total Number of Samples				0	0	0	8	8	8	8	8	8	8	6	8	9	9	9	8	8	8	8	9
Maximum Value				NA	NA	NA	9	23	35	50	16	52	<PQL	<PQL	<PQL	<PQL	<PQL	<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
BH1	0.35-0.45	F: Gravelly sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH1 - [LAB_DUP]	0.35-0.45	F: Gravelly sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH1	0.5-0.6	Silty clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH2	0.3-0.4	F: Silty gravelly sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH2	0.6-0.8	F: Silty clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH2	1.7-1.95	Silty clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
SDUP1	-	F: Gravelly sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
SDUP2	-	F: Silty gravelly sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
SDUP2 - [LAB_DUP]	-	F: Silty gravelly sand	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	120	300	2800	--	--	--	--	20

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
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*
Intra	BH1	0.35-0.45	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP1	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH2	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP2	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB1	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
Blank	19/10/23										
Trip	TS1		-	-	-	-	95%	98%	98%	98%	96%
Spike	19/10/23										

			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		*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		*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	BH1	0.35-0.45	<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	SDUP1	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH2	0.3-0.4	<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	SDUP2	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB1	-	<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	19/10/23																
Trip	TS1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	19/10/23																

			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	BH1	0.35-0.45	<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	SDUP1	-	<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	BH2	0.3-0.4	<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	SDUP2	-	<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	TB1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	19/10/23																					
Trip	TS1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	19/10/23																					

			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	BH1	0.35-0.45	<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	5	2	<1	<0.1	1	2
laboratory	SDUP1	-	<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	3	3	<1	<0.1	<1	2
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	4	2.5	nc	nc	0.75	2
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	50%	40%	nc	nc	67%	0%
Inter	BH2	0.3-0.4	<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	8	<0.4	23	18	34	<0.1	16	37
laboratory	SDUP2	-	<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	9	<0.4	18	16	50	<0.1	16	52
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	8.5	nc	20.5	17	42	nc	16	44.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	12%	nc	24%	12%	38%	nc	0%	34%
Field	TB1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	2	<1	3	<0.1	<1	1
Blank	19/10/23																						
Trip	TS1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	19/10/23																						

Result outside of QA/QC acceptance criteria

Appendix C: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
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
GSW:	General Solid Waste
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
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
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
RSW:	Restricted Solid Waste
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
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:

Site specific ABC values for specific metals have been adopted.

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.

JKEnvironments

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-B: 'Residential with minimal opportunities for soil access; including dwellings with fully/permanently paved yards like high-rise buildings'

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)			500	150	500	30000	1200	120	1200	60000	400	4	15	400	500	10	90	600	10	340	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH101	0.16-0.3	F: Silty sand	<4	<0.4	**9**	**93**	<1	<0.1	**52**	**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
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	<4	<0.4	**8**	**69**	<1	<0.1	**42**	**30**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH102	0.05-0.25	F: Silty sand	<4	<0.4	**4**	<1	**1**	<0.1	<1	<1	<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	0.5-0.8	Silty clay	<4	<0.4	**8**	**28**	**15**	<0.1	**6**	**24**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	0.05-0.2	F: Silty sand	<4	<0.4	**9**	<1	<1	<0.1	<1	<1	<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	0.05-0.2	F: Silty sand	<4	<0.4	**5**	**5**	<1	<0.1	**6**	**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
BH105	0.05-0.2	F: Silty sand	<4	<0.4	**10**	**15**	**9**	<0.1	**9**	**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
BH106	0-0.1	F: Silty clay	**7**	<0.4	**19**	**34**	**100**	<0.1	**11**	**180**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP107	0-0.1	F: Silty clay	**11**	**0.7**	**23**	**69**	**110**	<0.1	**11**	**160**	**0.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP107	0.9-1.1	Silty clay	**8**	<0.4	**18**	**33**	**27**	<0.1	**13**	**58**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP108	0-0.1	F: Silty clay	**7**	<0.4	**13**	**26**	**110**	**0.1**	**9**	**120**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP108	0.4-0.5	F: Silty clay	**8**	<0.4	**19**	**26**	**77**	**0.1**	**12**	**88**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH109	0.03-0.2	F: Silty sand	<4	<0.4	**66**	**27**	**4**	<0.1	**70**	**40**	**0.3**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH109	0.5-0.95	Silty clay	**5**	<0.4	**13**	**33**	**18**	<0.1	**9**	**40**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP110	0-0.1	F: Silty clay	**5**	**0.4**	**14**	**32**	**110**	<0.1	**14**	**120**	**2.6**	**0.6**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected
TP110	1.0-1.1	Silty clay	**5**	<0.4	**14**	**34**	**19**	<0.1	**8**	**41**	**0.09**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP111	0-0.1	F: Silty sandy clay	<4	<0.4	**34**	**12**	**28**	<0.1	**6**	**25**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	<4	<0.4	**10**	**18**	**34**	<0.1	**9**	**41**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP111 - [TRIPLICATE]	0-0.1	F: Silty sandy clay	<4	<0.4	**8**	**65**	<1	<0.1	**42**	**30**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP112	0-0.1	F: Silty clay	**7**	<0.4	**17**	**58**	**180**	**0.1**	**16**	**180**	**3.8**	**0.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP112	1.3-1.4	Silty clay	**5**	<0.4	**14**	**29**	**20**	<0.1	**8**	**43**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP113	0-0.1	F: Silty clay	**8**	<0.4	**20**	**59**	**460**	**0.4**	**15**	**310**	**2.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP113	0.7-0.8	F: Silty clay	**6**	<0.4	**15**	**33**	**93**	**0.1**	**10**	**81**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP101	-	F: Silty clay	**5**	<0.4	**10**	**20**	**73**	<0.1	**7**	**78**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP102	-	F: Silty sand	<4	<0.4	**8**	**79**	<1	<0.1	**46**	**31**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF101	-	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			25	25	25	25	25	25	25	25	24	24	18	18	18	18	18	18	18	18	18	15
Maximum Value			11	0.7	66	93	460	0.4	70	310	3.8	0.8	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	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	0.16-0.3	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
BH102	0.05-0.25	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH102	0.5-0.8	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH103	0.05-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH104	0.05-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH105	0.05-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH106	0-0.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
TP107	0-0.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
TP107	0.9-1.1	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP108	0-0.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	
TP108	0.4-0.5	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH109	0.03-0.2	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH109	0.5-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.5
TP110	0-0.1	F: Silty clay	0m to <1m	Sand	<25	**74**	<0.2	<0.5	<1	<1	<1	0.2
TP110	1.0-1.1	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
TP111	0-0.1	F: Silty sandy clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
TP112	0-0.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP112	1.3-1.4	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
TP113	0-0.1	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
TP113	0.7-0.8	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.5
SDUP101	-	F: Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP102	-	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
Total Number of Samples					24	24	24	24	24	24	24	19
Maximum Value					<PQL	74	<PQL	<PQL	<PQL	<PQL	<PQL	0.5

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	0.16-0.3	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0.05-0.25	Fill: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0.5-0.8	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0.05-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	0.05-0.2	Fill: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH105	0.05-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH106	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP107	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP107	0.9-1.1	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP108	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP108	0.4-0.5	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH109	0.03-0.2	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH109	0.5-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP110	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP110	1.0-1.1	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP111	0-0.1	F: Silty sandy clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP112	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP112	1.3-1.4	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP113	0-0.1	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP113	0.7-0.8	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP101	-	F: Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP102	-	F: Silty sand	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	0.16-0.3	Coarse	<25	<50	<100	<100
BH101 - [LAB_DUP]	0.16-0.3	Coarse	<25	<50	<100	<100
BH102	0.05-0.25	Coarse	<25	<50	<100	<100
BH102	0.5-0.8	Coarse	<25	<50	<100	<100
BH103	0.05-0.2	Coarse	<25	<50	<100	<100
BH104	0.05-0.2	Coarse	<25	<50	<100	<100
BH105	0.05-0.2	Coarse	<25	<50	<100	<100
BH106	0-0.1	Coarse	<25	<50	<100	<100
TP107	0-0.1	Coarse	<25	<50	<100	<100
TP107	0.9-1.1	Coarse	<25	<50	<100	<100
TP108	0-0.1	Coarse	<25	<50	<100	<100
TP108	0.4-0.5	Coarse	<25	<50	<100	<100
BH109	0.03-0.2	Coarse	<25	<50	<100	<100
BH109	0.5-0.95	Coarse	<25	<50	<100	<100
TP110	0-0.1	Coarse	<25	**74**	**280**	<100
TP110	1.0-1.1	Coarse	<25	<50	<100	<100
TP111	0-0.1	Coarse	<25	<50	<100	<100
TP111 - [LAB_DUP]	0-0.1	Coarse	<25	<50	<100	**120**
TP112	0-0.1	Coarse	<25	<50	<100	<100
TP112	1.3-1.4	Coarse	<25	<50	<100	<100
TP113	0-0.1	Coarse	<25	<50	<100	<100
TP113	0.7-0.8	Coarse	<25	<50	<100	<100
SDUP101	-	Coarse	<25	<50	<100	<100
SDUP102	-	Coarse	<25	<50	<100	<100
Total Number of Samples			24	24	24	24
Maximum Value			<PQL	74	280	120

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	0.16-0.3	Coarse	700	1000	2500	10000
BH101 - [LAB_DUP]	0.16-0.3	Coarse	700	1000	2500	10000
BH102	0.05-0.25	Coarse	700	1000	2500	10000
BH102	0.5-0.8	Coarse	700	1000	2500	10000
BH103	0.05-0.2	Coarse	700	1000	2500	10000
BH104	0.05-0.2	Coarse	700	1000	2500	10000
BH105	0.05-0.2	Coarse	700	1000	2500	10000
BH106	0-0.1	Coarse	700	1000	2500	10000
TP107	0-0.1	Coarse	700	1000	2500	10000
TP107	0.9-1.1	Coarse	700	1000	2500	10000
TP108	0-0.1	Coarse	700	1000	2500	10000
TP108	0.4-0.5	Coarse	700	1000	2500	10000
BH109	0.03-0.2	Coarse	700	1000	2500	10000
BH109	0.5-0.95	Coarse	700	1000	2500	10000
TP110	0-0.1	Coarse	700	1000	2500	10000
TP110	1.0-1.1	Coarse	700	1000	2500	10000
TP111	0-0.1	Coarse	700	1000	2500	10000
TP111 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
TP112	0-0.1	Coarse	700	1000	2500	10000
TP112	1.3-1.4	Coarse	700	1000	2500	10000
TP113	0-0.1	Coarse	700	1000	2500	10000
TP113	0.7-0.8	Coarse	700	1000	2500	10000
SDUP101	-	Coarse	700	1000	2500	10000
SDUP102	-	Coarse	700	1000	2500	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		5,600	4,200	5,800	8,100	140	21,000	5,900	17,000	2,200	
Site Use		**HIGH DENSITY RESIDENTIAL - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH101	0.16-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH101 - [LAB_DUP]	0.16-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
BH102	0.05-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH102	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH103	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH104	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
BH105	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH106	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP107	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP107	0.9-1.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
TP108	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	
TP108	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
BH109	0.03-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH109	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.5**
TP110	0-0.1	<25	**74**	**280**	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP110	1.0-1.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.4**
TP111	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
TP111 - [LAB_DUP]	0-0.1	<25	<50	<100	**120**	<0.2	<0.5	<1	<1	<1	-
TP112	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
TP112	1.3-1.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP113	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.4**
TP113	0.7-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.5**
SDUP101	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP102	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
Total Number of Samples		24	24	24	24	24	24	24	24	24	19
Maximum Value		<PQL	74	280	120	<PQL	<PQL	<PQL	<PQL	<PQL	0.5

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

JKEnvironments

TABLE S5
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-B: Residential with minimal opportunities for soil access

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**					**0.04**			**0.001**			**0.001**											**0.04**	**0.001**
20/05/2024	BH101	0.16-0.6	No	<10L	2,890	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH101	0.16-0.3		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
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20/05/2024	BH102	0.05-0.4	No	<10L	5,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH102	0.05-0.25		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
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20/05/2024	BH104	0.05-0.4	No	<10L	6,390	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH104	0.05-0.2		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
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20/05/2024	BH105	0.05-0.4	No	<10L	3,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH105	0.05-0.2		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
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21/05/2024	BH106	0-0.2	No		10,090	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH106	0-0.1		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
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20/05/2024	TP107	0-0.1	No		10,020	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		TP107	0-0.1		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
20/05/2024	TP107	0.1-0.2	No		8,790	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP107	0.2-0.5	No		10,780	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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20/05/2024	TP108	0-0.1	No		12,230	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP108	0.1-0.5	No		10,230	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		TP108	04-0.5		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
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20/05/2024	BH109	0.03-0.5	No		3,910	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		BH109	0.03-0.2		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
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20/05/2024	TP110	0-0.1	No		12,160	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		TP110	0-0.1		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	Chrysotile	–	0.002	<0.01	<0.001
20/05/2024	TP110	0.1-0.6	No		11,980	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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20/05/2024	TP111	0-0.1	No		11,960	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--		TP111	0-0.1		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
20/05/2024	TP111	0.1-0.4	No		10,110	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP111	0.4-0.6	No		11,760	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP112	0-0.1	No		12,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP112	0.1-0.5	No		10,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP112	0.5-0.9	No		10,330	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP113	0-0.2	No		10,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/05/2024	TP113	0.2-1.1	No		10,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH101	0.16-0.3	F: Silty sand	Coarse	9	21	7	<4	**9**	**93**	<1	**52**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	Coarse	9	21	7	<4	**8**	**69**	<1	**42**	**30**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0.05-0.25	F: Silty sand	Coarse	9	21	7	<4	**4**	<1	**1**	<1	<1	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0.5-0.8	Silty clay	Coarse	8.2	16	60	<4	**8**	**28**	**15**	**6**	**24**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH103	0.05-0.2	F: Silty sand	Coarse	9	21	7	<4	**9**	<1	<1	<1	<1	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH104	0.05-0.2	F: Silty sand	Coarse	9	21	7	<4	**5**	**5**	<1	**6**	**4**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH105	0.05-0.2	F: Silty sand	Coarse	9	21	7	<4	**10**	**15**	**9**	**9**	**17**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH106	0-0.1	F: Silty clay	Coarse	8.2	16	60	**7**	**19**	**34**	**100**	**11**	**180**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP107	0-0.1	F: Silty clay	Coarse	8.2	16	60	**11**	**23**	**69**	**110**	**11**	**160**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP107	0.9-1.1	Silty clay	Coarse	8.2	16	60	**8**	**18**	**33**	**27**	**13**	**58**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP108	0-0.1	F: Silty clay	Coarse	8.2	16	60	**7**	**13**	**26**	**110**	**9**	**120**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP108	0.4-0.5	F: Silty clay	Coarse	8.2	16	60	**8**	**19**	**26**	**77**	**12**	**88**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH109	0.03-0.2	F: Silty sand	Coarse	8.2	16	60	<4	**66**	**27**	**4**	**70**	**40**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH109	0.5-0.95	Silty clay	Coarse	8.2	16	60	**5**	**13**	**33**	**18**	**9**	**40**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP110	0-0.1	F: Silty clay	Coarse	8.2	16	60	**5**	**14**	**32**	**110**	**14**	**120**	<1	<0.1	<25	**74**	**280**	<100	<0.2	<0.5	<1	<1	**0.4**
TP110	1.0-1.1	Silty clay	Coarse	8.2	16	60	**5**	**14**	**34**	**19**	**8**	**41**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.09**
TP111	0-0.1	F: Silty sandy clay	Coarse	9	21	7	<4	**34**	**12**	**28**	**6**	**25**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	Coarse	9	21	7	<4	**10**	**18**	**34**	**9**	**41**	<1	<0.1	<25	<50	<100	**120**	<0.2	<0.5	<1	<1	<0.05
TP111 - [TRIPLICATE]	0-0.1	F: Silty sandy clay	Coarse	9	21	7	<4	**8**	**65**	<1	**42**	**30**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP112	0-0.1	F: Silty clay	Coarse	8.2	16	60	**7**	**17**	**58**	**180**	**16**	**180**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.54**
TP112	1.3-1.4	Silty clay	Coarse	8.2	16	60	**5**	**14**	**29**	**20**	**8**	**43**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP113	0-0.1	F: Silty clay	Coarse	8.2	16	60	**8**	**20**	**59**	**460**	**15**	**310**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
TP113	0.7-0.8	F: Silty clay	Coarse	8.2	16	60	**6**	**15**	**33**	**93**	**10**	**81**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP101	-	F: Silty clay	Coarse	8.2	16	60	**5**	**10**	**20**	**73**	**7**	**78**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP102	-	F: Silty sand	Coarse	9	21	7	<4	**8**	**79**	<1	**46**	**31**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
Total Number of Samples				25	25	25	25	25	25	25	25	25	24	18	24	24	24	24	24	24	24	24	24
Maximum Value				9	21	60	11	66	93	460	70	310	<PQL	<PQL	<PQL	74	280	120	<PQL	<PQL	<PQL	<PQL	0.54

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	0.16-0.3	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH102	0.05-0.25	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH102	0.5-0.8	Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
BH103	0.05-0.2	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH104	0.05-0.2	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH105	0.05-0.2	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH106	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP107	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP107	0.9-1.1	Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
TP108	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP108	0.4-0.5	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH109	0.03-0.2	F: Silty sand	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH109	0.5-0.95	Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
TP110	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP110	1.0-1.1	Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
TP111	0-0.1	F: Silty sandy clay	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
TP111 - [TRIPLICATE]	0-0.1	F: Silty sandy clay	Coarse	9	21	7	100	410	250	1300	360	1100	--	--	--	--	--	--	--	--	--	--	--
TP112	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP112	1.3-1.4	Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
TP113	0-0.1	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
TP113	0.7-0.8	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
SDUP101	-	F: Silty clay	Coarse	8.2	16	60	100	410	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
SDUP102	-	F: Silty sand	Coarse	9	21	7	100	410	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20

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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	0.16-0.3	F: Silty sand	<4	<0.4	9	93	<1	<0.1	52	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
BH101 - [LAB_DUP]	0.16-0.3	F: Silty sand	<4	<0.4	8	69	<1	<0.1	42	30	<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
BH102	0.05-0.25	Fill: Silty sand	<4	<0.4	4	<1	1	<0.1	<1	<1	<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	0.5-0.8	Silty clay	<4	<0.4	8	28	15	<0.1	6	24	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH103	0.05-0.2	F: Silty sand	<4	<0.4	9	<1	<1	<0.1	<1	<1	<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	0.05-0.2	Fill: Silty sand	<4	<0.4	5	5	<1	<0.1	6	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
BH105	0.05-0.2	F: Silty sand	<4	<0.4	10	15	9	<0.1	9	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
BH106	0-0.1	F: Silty clay	7	<0.4	19	34	100	<0.1	11	180	<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
TP107	0-0.1	F: Silty clay	11	0.7	23	69	110	<0.1	11	160	0.2	<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
TP107	0.9-1.1	Silty clay	8	<0.4	18	33	27	<0.1	13	58	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP108	0-0.1	F: Silty clay	7	<0.4	13	26	110	0.1	9	120	<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
TP108	0.4-0.5	F: Silty clay	8	<0.4	19	26	77	0.1	12	88	<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
BH109	0.03-0.2	F: Silty sand	<4	<0.4	66	27	4	<0.1	70	40	0.3	<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
BH109	0.5-0.95	Silty clay	5	<0.4	13	33	18	<0.1	9	40	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP110	0-0.1	F: Silty clay	5	0.4	14	32	110	<0.1	14	120	2.6	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	200	180	380	<0.2	<0.5	<1	<1	Detected
TP110	1.0-1.1	Silty clay	5	<0.4	14	34	19	<0.1	8	41	0.09	0.09	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP111	0-0.1	F: Silty sandy clay	<4	<0.4	34	12	28	<0.1	6	25	<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
TP111 - [LAB_DUP]	0-0.1	F: Silty sandy clay	<4	<0.4	10	18	34	<0.1	9	41	<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
TP111 - [TRIPLICATE]	0-0.1	F: Silty sandy clay	<4	<0.4	8	65	<1	<0.1	42	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP112	0-0.1	F: Silty clay	7	<0.4	17	58	180	0.1	16	180	3.8	0.54	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP112	1.3-1.4	Silty clay	5	<0.4	14	29	20	<0.1	8	43	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP113	0-0.1	F: Silty clay	8	<0.4	20	59	460	0.4	15	310	2.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP113	0.7-0.8	F: Silty clay	6	<0.4	15	33	93	0.1	10	81	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP101	-	F: Silty clay	5	<0.4	10	20	73	<0.1	7	78	<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	-	F: Silty sand	<4	<0.4	8	79	<1	<0.1	46	31	<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
FCF101	-	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			25	25	25	25	25	25	25	25	24	24	18	18	18	18	18	24	24	24	24	24	24	24	24	24	15
Maximum Value			11	0.7	66	93	460	0.4	70	310	3.8	0.54	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	200	180	380	<PQL	<PQL	<PQL	<PQL	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

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TABLE S8
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Lead	Nickel
PQL - Envirolab Services			0.03	0.02
TCLP1 - General Solid Waste			5	2
TCLP2 - Restricted Solid Waste			20	8
TCLP3 - Hazardous Waste			>20	>8
Sample Reference	**Sample Depth**	**Sample Description**		
BH101	0.16-0.3	F: Silty sand	NA	**0.2**
TP107	0-0.1	F: Silty clay	<0.03	NA
BH109	0.03-0.2	F: Silty sand	NA	**0.08**
TP110	0-0.1	F: Silty clay	<0.03	NA
TP112	0-0.1	F: Silty clay	**0.03**	NA
TP113	0-0.1	F: Silty clay	**0.05**	NA
Total Number of samples			4	2
Maximum Value			0.05	0.2

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

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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
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*
Intra	TP108	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP101	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	BH101	0.16-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP102	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-101	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
Blank	20/05/24										
Field	TB-102	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
Blank	20/05/24										
Trip	TS-101		-	-	-	-	106%	106%	103%	110%	103%
Spike	20/05/24										
Trip	TS-102		-	-	-	-	108%	106%	106%	118%	107%
Spike	20/05/24										
Field	FR101-HA	µg/L	<10	170	250	<100	<1	<1	<1	<2	<1
Rinsate	21/05/24										

			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		*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		*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	TP108	0-0.1	<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	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	BH101	0.16-0.3	<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	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-101	-	<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	20/05/24																
Field	TB-102	-	<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	20/05/24																
Trip	TS-101		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																
Trip	TS-102		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																
Field	FR101-HA	µg/L	<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	21/05/24																

			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	TP108	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	-	<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
Intra	BH101	0.16-0.3	<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	-	<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	TB-101	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	20/05/24																					
Field	TB-102	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	20/05/24																					
Trip	TS-101		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																					
Trip	TS-102		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																					
Field	FR101-HA	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	21/05/24																					

			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	TP108	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	7	<0.4	13	26	110	0.1	9	120
laboratory	SDUP101	-	<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	5	<0.4	10	20	73	<0.1	7	78
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	6	nc	11.5	23	91.5	0.075	8	99
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	33%	nc	26%	26%	40%	67%	25%	42%
Intra	BH101	0.16-0.3	<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	9	93	<1	<0.1	52	36
laboratory	SDUP102	-	<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	79	<1	<0.1	46	31
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	8.5	86	nc	nc	49	33.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	12%	16%	nc	nc	12%	15%
Field	TB-101	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	3	<1	3	<0.1	<1	1
Blank	20/05/24																						
Field	TB-102	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	4	<1	5	<0.1	<1	2
Blank	20/05/24																						
Trip	TS-101		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																						
Trip	TS-102		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	20/05/24																						
Field	FR101-HA	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.01	<0.01	0.04	<0.03	<0.0005	<0.02	0.04
Rinsate	21/05/24																						

Result outside of QA/QC acceptance criteria

Rinsate metals results in mg/L

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ADWG: AustralianDrinking Water Guidelines
ANZG Australian and New Zealand Guidelines
B(a)P: Benzo(a)pyrene
CRC: Cooperative Research Centre
ESLs: Ecological Screening Levels
GIL: Groundwater Investigation Levels
HILs: Health Investigation Levels
HSLs: Health Screening Levels
HSL-SSA: Health Screening Level-SiteSpecific Assessment
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
ppm: Parts per million
PCBs: Polychlorinated Biphenyls
PCE: Perchloroethylene (Tetrachloroethylene or Tetrachloroethene)
PQL: Practical Quantitation Limit
RS: Rinsate Sample
RSL: Regional Screening Levels
SAC: Site Assessment Criteria
SSA: Site Specific Assessment
SSHSLs Site Specific Health Screening Levels
TB: Trip Blank
TCA: 1,1,1 Trichloroethane (methyl chloroform)
TCE: Trichloroethylene (Trichloroethene)
TS: Trip Spike
TRH: Total Recoverable Hydrocarbons
UCL: Upper Level Confidence Limit on Mean Value
USEPA United States Environmental Protection Agency
VOCC: Volatile Organic Chlorinated Compounds
WHO: World Health Organisation

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TABLE G1
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES MW1	MW1 - [LAB_DUP]	MW2	MW2 - [LAB_DUP]	WDUP101	WDUP102
Inorganic Compounds and Parameters								
pH		6.5 - 8.5	**7.7**	NA	**6.3**	NA	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**1600**	NA	**11000**	NA	NA	NA
Turbidity (NTU)		NSL	NA	NA	NA	NA	NA	NA
Metals and Metalloids								
Arsenic (As III)	1	24	<1	NA	<1	<1	<1	<2
Cadmium	0.1	0.2	<0.1	NA	<0.1	<0.1	<0.1	<0.2
Chromium (SAC for Cr III adopted)	1	3.3	<1	NA	<1	<1	<1	<2
Copper	1	1.4	<1	NA	<1	<1	<1	<2
Lead	1	3.4	<1	NA	<1	<1	<1	<2
Total Mercury (inorganic)	0.05	0.06	<0.05	NA	<0.05	NA	<0.05	<0.050
Nickel	1	11	<1	NA	**7**	**7**	<1	**7.8**
Zinc	1	8	**2**	NA	**24**	**26**	**2**	**22**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)								
Benzene	1	950	<1	<1	<1	NA	<1	<1
Toluene	1	180	<1	<1	<1	NA	<1	<1
Ethylbenzene	1	80	<1	<1	<1	NA	<1	<1
m+p-xylene	2	75	<2	<2	<2	NA	<2	<2
o-xylene	1	350	<1	<1	<1	NA	<1	<1
Total xylenes	2	NSL	<2	<2	<2	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	0.2	16	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

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TABLE G2
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	SAMPLES					
			MW1	MW1 - [LAB_DUP]	MW2	MW2 - [LAB_DUP]	WDUP101	WDUP102
Inorganic Compounds and Parameters								
pH		6.5 - 8.5	**7.7**	NA	**6.3**	NA	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**1600**	NA	**11000**	NA	NA	NA
Turbidity (NTU)		NSL	NA	NA	NA	NA	NA	NA
Metals and Metalloids								
Arsenic (As III)	1	100	<1	NA	<1	<1	<1	<2
Cadmium	0.1	20	<0.1	NA	<0.1	<0.1	<0.1	<0.2
Chromium (total)	1	500	<1	NA	<1	<1	<1	<2
Copper	1	20000	<1	NA	<1	<1	<1	<2
Lead	1	100	<1	NA	<1	<1	<1	<2
Total Mercury (inorganic)	0.05	10	<0.05	NA	<0.05	NA	<0.05	<0.050
Nickel	1	200	<1	NA	**7**	**7**	<1	**7.8**
Zinc	1	30000	**2**	NA	**24**	**26**	**2**	**22**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)								
Benzene	1	10	<1	<1	<1	NA	<1	<1
Toluene	1	8000	<1	<1	<1	NA	<1	<1
Ethylbenzene	1	3000	<1	<1	<1	NA	<1	<1
m+p-xylene	2	NSL	<2	<2	<2	NA	<2	<2
o-xylene	1	NSL	<1	<1	<1	NA	<1	<1
Total xylenes	2	6000	<2	<2	<2	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)								
Naphthalene	0.2	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Fluoranthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

TABLE G3
GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011	WHO 2008	USEPA RSL Tapwater 2017	SAMPLES					
					MW1	MW1 - [LAB_DUP]	MW2	MW2 - [LAB_DUP]	WDUP101	WDUP102
Total Recoverable Hydrocarbons (TRH)										
C_6-C_9 Aliphatics (assessed using F1)	10	-	100	-	<10	<10	<10	NA	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	100	-	<50	<50	<50	NA	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)										
Benzene	1	1	-	-	<1	<1	<1	NA	<1	<1
Toluene	1	800	-	-	<1	<1	<1	NA	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	NA	<1	<1
Total xylenes	2	600	-	-	<2	<2	<2	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (PAHs)										
Naphthalene	1	-	-	6.1	<1	<1	<1	NA	<1	<1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

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TABLE Q2
GROUNDWATER 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	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD	*10*	*50*	*100*	*100*	*1*	*1*	*1*	*2*	*1*	*0.2*	*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*	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
	PQL Envirolab VIC	*10*	*50*	*100*	*100*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*0.2*	*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*	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
Intra	MW1	<10	<50	<100	<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	<1	<0.1	<1	<1	<1	<0.05	<1	2
laboratory	WDUP101	<10	<50	<100	<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	<1	<0.1	<1	<1	<1	<0.05	<1	2
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	nc	nc	nc	nc	nc	nc	nc	2
	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	nc	nc	nc	nc	nc	nc	nc	0%
Inter	MW2	<10	<50	<100	<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	<1	<0.1	<1	<1	<1	<0.05	7	24
laboratory	WDUP102	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<2	<0.2	<2	<2	<2	<0.050	7.8	22
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	nc	nc	nc	nc	nc	nc	7.4	23
	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	nc	nc	nc	nc	nc	nc	11%	9%
Field	TB-W101	<10	150	<100	<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	<1	<0.1	<1	<1	<1	<0.05	<1	<1
Blank	27/05/2024																																
Trip	TS-W101	-	-	-	-	102%	96%	100%	94%	90%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spike	27/05/2024																																

Result outside of QA/QC acceptance criteria: Value

Appendix D: Borehole / Test pit Logs

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH101**

1/2

SDUP102: 0.16-0.3m

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			CONCRETE: 160mm.t				
					-	FILL: Silty sand, fine to medium grained, dark grey, trace of igneous gravel, clay nodules and asphalt fragments.	D			SCREEN: 2.89kg (<10L), 0.16-0.6m, NO FCF
			0.5		CL-CI	Silty CLAY: low to medium plasticity, grey mottled brown, trace of ironstone gravel.	w<PL			RESIDUAL
			1							
			1.5		-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			ASHFIELD SHALE LOW 'TC' BIT RESISTANCE
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH101**

SDUP102: 0.16-0.3m

Client: CAMPBELLTOWN CATHOLIC CLUB
Project: PROPOSED DEVELOPMENT
Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A
Date: 20/5/24 **Datum:** -
Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			
							4							
							4.5							
							5							
							5.5							GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.0m TO 1.3m. CASING 0m TO 1. 3m. 2mm SAND FILTER PACK 4.7m TO 0.8 m. BENTONITE SEAL 0.8m TO 0.3m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							6			END OF BOREHOLE AT 6.0m				
							6.5							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH102** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB
Project: PROPOSED DEVELOPMENT
Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A
Date: 20/5/24 **Datum:** -
Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sand, fine to medium grained, grey, trace of asphalt and concrete fragments.	M			SCREEN: 5.70kg (<10L), 0.05-0.4m, NO FCF
		N = 118 2,6,12	0.5		CI-CH	Silty CLAY: medium to high plasticity, grey mottled brown, trace of ironstone gravel.	w≈PL			RESIDUAL
					-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			ASHFIELD SHALE LOW 'TC' BIT RESISTANCE
			1			END OF BOREHOLE AT 1.0m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH103**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			ASPHALTIC CONCRETE: 50mm.t				
									-	FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel and asphalt fragments.	M			INSUFFICIENT RETURN FOR BULK SAMPLE
										FILL: Silty clay, medium to high plasticity, brown, trace igneous and sandstone gravel.	w≈PL			INSUFFICIENT RETURN FOR BULK SAMPLE
						N = 7 2,2,5	0.5		CI-CH	Silty CLAY: medium to high plasticity, orange brown mottled grey and red, trace of igneous gravel and root fibres.	w≈PL			RESIDUAL
									-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			ASHFIELD SHALE
							1			END OF BOREHOLE AT 1.0m				LOW 'TC' BIT RESISTANCE
							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: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sand, fine to medium grained, grey, trace of asphalt and concrete fragments.	M			SCREEN: 6.39kg (<10L), 0.05-0.4m, NO FCF
		N = 7 2,3,4	0.5		CI-CH	Silty CLAY: medium to high plasticity, grey mottled orange, 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

Log No. **BH105**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sand, fine to medium grained, grey, trace of asphalt and concrete fragments.	M			SCREEN: 3.8kg (<10L), 0.05-0.4m, NO FCF
			0.5			FILL: Silty clay, medium to high plasticity, brown and orange brown, trace of sand and igneous gravel.				INSUFFICIENT RETURN FOR BULK SCREEN
		N = 13 3,5,8			CI-CH	Silty CLAY: medium to high plasticity, orange brown mottled grey and red, trace of ironstone gravel.	w≈PL			RESIDUAL
					-	Extremely Weathered siltstone: silty CLAY, low to medium plasticity, grey.	XW			ASHFIELD SHALE LOW 'TC' BIT RESISTNCE
			1			END OF BOREHOLE AT 1.0m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH106** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 21/5/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty clay, medium plasticity, dark brown, trace of ironstone gravel, sand, glass fragments, ash, roots and root fibres.	w≈PL			GRASS COVER SCREEN: 10.9kg 0-0.2m, NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, light brown.	w≈PL			RESIDUAL
							0.5							
										END OF BOREHOLE AT 0.7m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP107**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 21/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, low to medium plasticity, dark brown, trace of igneous gravel, ash, roots and root fibres.	w≈PL			GRASS COVER
							M			SCREEN: 10.2kg 0-0.1m, NO FCF
						FILL: Clayey sandy gravel, fine to coarse grained igneous gravel, dark grey, fine to medium grained sand, trace of sandstone gravel, brick fragments, ash, slag and roots.	w≈PL			SCREEN: 8.79kg 0.1-0.2, NO FCF SCREEN: 10.78kg 0.2-0.5m, NO FCF
			0.5		CI-CH	FILL: Silty clay, medium to high plasticity, brown.	w≈PL			RESIDUAL
						Silty CLAY: medium to high plasticity, light brown.				
			1			END OF TEST PIT AT 1.0m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP108** 1/1

Environmental logs are not to be used for geotechnical purposes

SDUP101: 0-0.1m

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, medium to high plasticity, dark brown, trace of igneous gravel, sand, glass fragments, ash, roots and root fibres.	w≈PL			GRASS COVER SCREEN: 12.33kg 0-0.1m, NO FCF
						FILL: Silty clay, medium to high plasticity, brown, trace of ash.				SCREEN: 10.23kg 0.1-0.5m, NO FCF
			0.5		CI-CH	Silty CLAY: medium to high plasticity, light brown.	w≈PL			RESIDUAL
			1			END OF TEST PIT AT 1.0m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH109** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JK309 **Logged/Checked by:** A.D./T.H.

Groundwater Record	SAMPLES ES ASS ASB SAL DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0		-	ASPHALTIC CONCRETTE: 30mm.t FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel, clay nodules, asphalt and concrete fragments.	M			SCREEN: 3.91kg (<10L) 0.03-0.5m, NO FCF
		N = 8 3,3,5	0.5		CI-CH	Silty CLAY: medium to high plasticity, orange brown mottled yellow 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

Log No. **TP110**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES ES ASS ASB SAL DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel, glass and ceramic fragments, roots and root fibres.	w≈PL			GRASS COVER SCREEN: 12.16kg 0-0.1m, NO FCF SCREEN: 11.98kg 0.1-0.6m, NO FCF
			0.5							
					CI-CH	Silty CLAY: medium to high plasticity, light brown.	w≈PL			RESIDUAL
			1							
						END OF TEST PIT AT 1.1m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP111** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sandy clay, medium plasticity, dark brown, fine to medium grained sand, trace of igneous gravel, asphalt fragments, roots and root fibres.	w≈PL			GRASS COVER SCREEN: 11.96kg 0-0.1m, NO FCF SCREEN: 10.11kg 0.1-0.4m, NO FCF
			0.5			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel and ceramic fragments.				SCREEN: 11.76kg 0.4-0.6m, NO FCF
					CI-CH	Silty CLAY: medium to high plasticity, light brown.	w≈PL			RESIDUAL
			1			END OF TEST PIT AT 1.0m				
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP112** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clay, low to medium plasticity, brown, trace of igneous gravel, sand, glass and ceramic fragments, roots and root fibres.	w<PL			GRASS COVER SCREEN: 12.15kg 0-0.1m, NO FCF SCREEN: 10.4kg 0.1-0.5m, NO FCF
			0.5			FILL: Silty clay, high plasticity, light brown, trace of igneous gravel and root fibres.	w≈PL			SCREEN: 10.33kg 0.5-0.9m, NO FCF
			1		CI-CH	Silty CLAY: medium to high plasticity, light brown.	w≈PL			RESIDUAL
			1.5			END OF TEST PIT AT 1.4m				
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP113** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: CAMPBELLTOWN CATHOLIC CLUB

Project: PROPOSED DEVELOPMENT

Location: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Job No.: E36287BL **Method:** TEST PIT **R.L. Surface:** N/A

Date: 20/5/24 **Datum:** -

Plant Type: JKX **Logged/Checked by:** O.B./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			FILL: Silty clay, medium to high plasticity, dark brown, trace of igneous and sandstone gravel, brick, ceramic and glass fragments, ash, slag and root fibres.	w≈PL			GRASS COVER SCREEN: 10.15kg 00.2m, NO FCF
			0.5			FILL: Silty clay, medium to high plasticity, orange brown, trace of sandstone cobbles, sand, brick and glass fragments and ash.				SCREEN: 10.9kg 0.2-1.1m, NO FCF
▼			1							
						END OF TEST PIT AT 1.1m				EXCAVATOR REFUSAL ON SANDSTONE BOULDERS
			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:

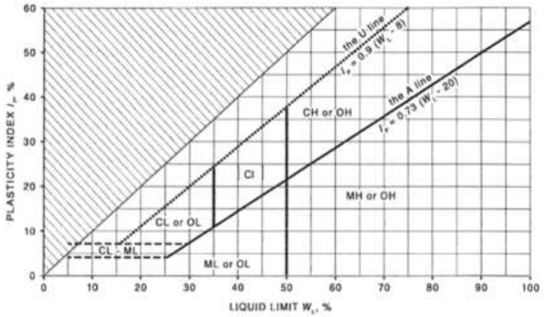
$$C_U = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_C = \frac{(D_{30})^2}{D_{10}\, D_{60}}$$

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



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LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
	C	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	Vane shear reading in kPa of undrained shear strength.
	PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.
	w ≈ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	w ≈ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.

Log Column	Symbol	Definition	Density Index (I_D) Range (%)	SPT 'N' Value Range (Blows/300mm)
Density Index/ Relative Density (Cohesionless Soils)	VL	VERY LOOSE	≤ 15	0 – 4
	L	LOOSE	> 15 and ≤ 35	4 – 10
	MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30
	D	DENSE	> 65 and ≤ 85	30 – 50
	VD	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

<table>
<tr><th colspan="2">Term</th><th colspan="2">Abbreviation</th><th>Definition</th></tr>
<tr><td colspan="2">Residual Soil</td><td colspan="2">RS</td><td>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.</td></tr>
<tr><td colspan="2">Extremely Weathered</td><td colspan="2">XW</td><td>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.</td></tr>
<tr><td>Highly Weathered</td><td rowspan="2">Distinctly Weathered (Note 1)</td><td>HW</td><td rowspan="2">DW</td><td>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.</td></tr>
<tr><td>Moderately Weathered</td><td>MW</td><td>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.</td></tr>
<tr><td colspan="2">Slightly Weathered</td><td colspan="2">SW</td><td>Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Fresh</td><td colspan="2">FR</td><td>Rock shows no sign of decomposition of individual minerals or colour changes.</td></tr>
</table>

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 E: Laboratory Report(s) & COC Documents

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CERTIFICATE OF ANALYSIS 351818

Client Details

Client	JK Environments
Attention	Harry Leonard
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36287BL Campbelltown**
Number of Samples	41 Soil, 1 Water, 1 Material
Date samples received	21/05/2024
Date completed instructions received	21/05/2024

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	28/05/2024
Date of Issue	28/05/2024

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Asbestos Approved By
Analysed by Asbestos Approved Analyst: Lucy Zhu, Sneha Shakya
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Lucy Zhu, Asbestos Supervisor
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	27/05/2024	27/05/2024	27/05/2024	27/05/2024	27/05/2024
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	%	86	96	92	94	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	27/05/2024	27/05/2024	27/05/2024	27/05/2024	27/05/2024
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	%	98	86	93	99	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	27/05/2024	27/05/2024	27/05/2024	27/05/2024	27/05/2024
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	%	87	94	98	90	98

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		351818-38	351818-39	351818-40	351818-41
Your Reference	UNITS	TS-101	TS-102	TB-101	TB-102
Depth		-	-	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	27/05/2024	27/05/2024	27/05/2024	27/05/2024
TRH C_6 - C_9	mg/kg	[NA]	[NA]	<25	<25
TRH C_6 - C_{10}	mg/kg	[NA]	[NA]	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	[NA]	<25	<25
Benzene	mg/kg	106%	108%	<0.2	<0.2
Toluene	mg/kg	106%	106%	<0.5	<0.5
Ethylbenzene	mg/kg	103%	106%	<1	<1
m+p-xylene	mg/kg	110%	118%	<2	<2
o-Xylene	mg/kg	103%	107%	<1	<1
Naphthalene	mg/kg	[NA]	[NA]	<1	<1
Total +ve Xylenes	mg/kg	[NA]	[NA]	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	98	99	101

svTRH (C10-C40) in Soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	82	80	80	81	81

svTRH (C10-C40) in Soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	200
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	180
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	390
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	74
TRH >C_{10}-C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	74
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100	<100	280
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	350
Surrogate o-Terphenyl	%	83	85	95	96	90

svTRH (C10-C40) in Soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	84	86	90	94	91

svTRH (C10-C40) in Soil			
Our Reference		351818-40	351818-41
Your Reference	UNITS	TB-101	TB-102
Depth		-	-
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date extracted	-	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024
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	<50	<50
Surrogate o-Terphenyl	%	105	94

PAHs in Soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
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	%	95	90	92	92	90

PAHs in Soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	0.2	<0.1	0.3	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.8
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
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	0.2
Total +ve PAH's	mg/kg	<0.05	0.2	<0.05	0.3	2.6
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	0.6
Surrogate p-Terphenyl-d14	%	92	95	92	90	90

PAHs in Soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	0.2	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	0.3	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.5	0.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.4	0.2	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.3	0.2	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.8	0.4	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.54	0.2	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.3	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	0.4	0.2	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	3.8	2.2	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.7	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.8	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	97	91	94	93	94

PAHs in Soil			
Our Reference		351818-40	351818-41
Your Reference	UNITS	TB-101	TB-102
Depth		-	-
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date extracted	-	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024
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	%	92	96

Organochlorine Pesticides in soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
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
Surrogate 4-Chloro-3-NBTF	%	89	83	84	83	88

Organochlorine Pesticides in soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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
Surrogate 4-Chloro-3-NBTF	%	86	90	89	89	86

Organochlorine Pesticides in soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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
Surrogate 4-Chloro-3-NBTF	%	92	87	89	93	86

Organophosphorus Pesticides in Soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
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	%	89	83	84	83	88

Organophosphorus Pesticides in Soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	86	90	89	89	86

Organophosphorus Pesticides in Soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	92	87	89	93	86

PCBs in Soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
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	%	91	91	91	90	92

PCBs in Soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	94	98	92	93	94

PCBs in Soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
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	%	94	95	98	96	95

Acid Extractable metals in soil						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	9	4	9	5	10
Copper	mg/kg	93	<1	<1	5	15
Lead	mg/kg	<1	1	<1	<1	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	52	<1	<1	6	9
Zinc	mg/kg	36	<1	<1	4	17

Acid Extractable metals in soil						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Arsenic	mg/kg	7	11	8	<4	5
Cadmium	mg/kg	<0.4	0.7	<0.4	<0.4	0.4
Chromium	mg/kg	19	23	19	66	14
Copper	mg/kg	34	69	26	27	32
Lead	mg/kg	100	110	77	4	110
Mercury	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	11	11	12	70	14
Zinc	mg/kg	180	160	88	40	120

Acid Extractable metals in soil						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Arsenic	mg/kg	<4	7	8	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	34	17	20	10	8
Copper	mg/kg	12	58	59	20	79
Lead	mg/kg	28	180	460	73	<1
Mercury	mg/kg	<0.1	0.1	0.4	<0.1	<0.1
Nickel	mg/kg	6	16	15	7	46
Zinc	mg/kg	25	180	310	78	31

Acid Extractable metals in soil				
Our Reference		351818-40	351818-41	351818-44
Your Reference	UNITS	TB-101	TB-102	TP111 - [TRIPLICATE]
Depth		-	-	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024
Arsenic	mg/kg	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	3	4	8
Copper	mg/kg	<1	<1	65
Lead	mg/kg	3	5	<1
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	42
Zinc	mg/kg	1	2	30

Moisture						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Moisture	%	3.2	11	14	12	9.5

Moisture						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Moisture	%	20	26	20	5.6	10

Moisture						
Our Reference		351818-28	351818-31	351818-34	351818-36	351818-37
Your Reference	UNITS	TP111	TP112	TP113	SDUP101	SDUP102
Depth		0-0.1	0-0.1	0-0.1	-	-
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	22/05/2024	22/05/2024	22/05/2024	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024	23/05/2024	23/05/2024	23/05/2024
Moisture	%	8.1	12	22	24	3.5

Moisture			
Our Reference		351818-40	351818-41
Your Reference	UNITS	TB-101	TB-102
Depth		-	-
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date prepared	-	22/05/2024	22/05/2024
Date analysed	-	23/05/2024	23/05/2024
Moisture	%	0.7	0.6

Asbestos ID - soils NEPM - ASB-001						
Our Reference		351818-1	351818-4	351818-6	351818-9	351818-11
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.16-0.3	0.05-0.25	0.05-0.2	0.05-0.2	0.05-0.2
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Sample mass tested	g	1,105.44	911.49	915.26	741.14	938.74
Sample Description	-	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey 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

Asbestos ID - soils NEPM - ASB-001						
Our Reference		351818-14	351818-16	351818-21	351818-23	351818-25
Your Reference	UNITS	BH106	TP107	TP108	BH109	TP110
Depth		0-0.1	0-0.1	04-0.5	0.03-0.2	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Sample mass tested	g	682.8	342.3	578.6	994.63	782.92
Sample Description	-	Brown coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Grey 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	Chrysotile
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	0.0020
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	YES

Asbestos ID - soils NEPM - ASB-001				
Our Reference		351818-28	351818-31	351818-34
Your Reference	UNITS	TP111	TP112	TP113
Depth		0-0.1	0-0.1	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil
Date analysed	-	28/05/2024	28/05/2024	28/05/2024
Sample mass tested	g	658.54	798.12	615.65
Sample Description	-	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
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<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
ACM >7mm Estimation*	g	–	–	–
FA and AF Estimation*	g	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001
Asbestos comments	-	Nil	Nil	Nil

Asbestos ID - materials		
Our Reference		351818-43
Your Reference	UNITS	FCF101
Depth		-
Date Sampled		20/05/2024
Type of sample		Material
Date analysed	-	23/04/2024
Mass / Dimension of Sample	-	45x40x5mm
Sample Description	-	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected
Trace Analysis	-	[NT]

vTRH(C6-C10)/BTEXN in Water		
Our Reference		351818-42
Your Reference	UNITS	FR101-HA
Depth		-
Date Sampled		20/05/2024
Type of sample		Water
Date extracted	-	27/05/2024
Date analysed	-	28/05/2024
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
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	%	95
Surrogate 4-Bromofluorobenzene	%	102

svTRH (C10-C40) in Water		
Our Reference		351818-42
Your Reference	UNITS	FR101-HA
Depth		-
Date Sampled		20/05/2024
Type of sample		Water
Date extracted	-	23/05/2024
Date analysed	-	23/05/2024
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	340
TRH C_{29} - C_{36}	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	340
TRH >C_{10} - C_{16}	µg/L	170
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	170
TRH >C_{16} - C_{34}	µg/L	250
TRH >C_{34} - C_{40}	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	420
Surrogate o-Terphenyl	%	77

PAHs in Water		
Our Reference		351818-42
Your Reference	UNITS	FR101-HA
Depth		-
Date Sampled		20/05/2024
Type of sample		Water
Date extracted	-	23/05/2024
Date analysed	-	23/05/2024
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	%	72

Metals in Waters - Acid extractable		
Our Reference		351818-42
Your Reference	UNITS	FR101-HA
Depth		-
Date Sampled		20/05/2024
Type of sample		Water
Date prepared	-	24/05/2024
Date analysed	-	27/05/2024
Arsenic - Total	mg/L	<0.05
Cadmium - Total	mg/L	<0.01
Chromium - Total	mg/L	<0.01
Copper - Total	mg/L	0.04
Lead - Total	mg/L	<0.03
Mercury - Total	mg/L	<0.0005
Nickel - Total	mg/L	<0.02
Zinc - Total	mg/L	0.04

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-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			27/05/2024	1	27/05/2024	27/05/2024		27/05/2024	27/05/2024
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	121	119
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	121	119
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	110	112
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	113	113
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	107	104
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	137	133
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	102	101
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	100	1	86	99	14	102	103

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	27/05/2024	27/05/2024		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	28	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	28	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	28	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	28	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	28	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	28	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	28	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	28	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	28	87	98	12	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	23/05/2024	23/05/2024		23/05/2024	23/05/2024
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	112	96
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	118	92
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	102	96
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	112	96
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	118	92
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	102	96
Surrogate o-Terphenyl	%		Org-020	83	1	82	81	1	93	107

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	28	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	28	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	28	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	28	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	28	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	28	<100	120	18	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	28	84	82	2	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	90
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	92	90
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	80
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	92
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	96	90
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	88
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	70	66
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	88	80
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	93	1	95	95	0	89	85

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	28	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	28	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	28	97	93	4	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	78
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	90	75
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	82	80
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	90	82
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	88
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	84	75
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	78
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	76
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	102	92
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	66	61
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	87	1	89	85	5	86	85

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	28	92	87	6	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	118	98
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	92	86
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	114
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	112	90
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	106	102
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	100	116
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	116	116
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	87	1	89	85	5	86	85

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Fenthion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Phosalone	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	28	92	87	6	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date extracted	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
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	87	80
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	93	1	91	93	2	85	84

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021/022/025	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	[NT]	28	94	93	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	351818-4
Date prepared	-			22/05/2024	1	22/05/2024	22/05/2024		22/05/2024	22/05/2024
Date analysed	-			23/05/2024	1	23/05/2024	23/05/2024		23/05/2024	23/05/2024
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	99	85
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	96	92
Chromium	mg/kg	1	Metals-020	<1	1	9	8	12	98	83
Copper	mg/kg	1	Metals-020	<1	1	93	69	30	101	104
Lead	mg/kg	1	Metals-020	<1	1	<1	<1	0	99	#
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	93	70
Nickel	mg/kg	1	Metals-020	<1	1	52	42	21	97	#
Zinc	mg/kg	1	Metals-020	<1	1	36	30	18	94	#

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	28	22/05/2024	22/05/2024		[NT]	[NT]
Date analysed	-			[NT]	28	23/05/2024	23/05/2024		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	28	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	28	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	28	34	10	109	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	28	12	18	40	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	28	28	34	19	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	28	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	28	6	9	40	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	28	25	41	48	[NT]	[NT]

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	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Date analysed	-			28/05/2024	[NT]	[NT]	[NT]	[NT]	28/05/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	91	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	89	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	102	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate Toluene-d8	%		Org-023	100	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	99	[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	-			23/05/2024	[NT]	[NT]	[NT]	[NT]	23/05/2024	[NT]
Date analysed	-			23/05/2024	[NT]	[NT]	[NT]	[NT]	23/05/2024	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	81	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			23/05/2024	[NT]	[NT]	[NT]	[NT]	23/05/2024	[NT]
Date analysed	-			23/05/2024	[NT]	[NT]	[NT]	[NT]	23/05/2024	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	82	[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]	75	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	73	[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]	74	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	79	[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]	66	[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]	85	[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	76	[NT]	[NT]	[NT]	[NT]	74	[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	-			24/05/2024	[NT]	[NT]	[NT]	[NT]	24/05/2024	[NT]
Date analysed	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Arsenic - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cadmium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Copper - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
Lead - Total	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	95	[NT]
Mercury - Total	mg/L	0.0005	Metals-021	<0.0005	[NT]	[NT]	[NT]	[NT]	114	[NT]
Nickel - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	98	[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 351818-28 for Cr, Cu & Zn. Therefore a triplicate result has been issued as laboratory sample number 351818-44.
- # Trace elements: Low spike recovery has been obtained for those elements. This is probably due to matrix interference causing signal suppression for those particular elements. The sample has been re-spiked and re-analysed and the low spike recovery has been confirmed. However, an acceptable recovery was obtained for the LCS.

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.

Factual description of asbestos identified in the soil samples: NEPM
Sample 351818-25; Chrysotile asbestos identified in 0.0025g of fibrous matted material

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ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Harry Leonard

Sample Login Details	
Your reference	E36287BL Campbelltown
Envirolab Reference	351818
Date Sample Received	21/05/2024
Date Instructions Received	21/05/2024
Date Results Expected to be Reported	28/05/2024

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	41 Soil, 1 Water, 1 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	8
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:

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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	Asbestos ID - materials	Asbestos in Water*	On Hold
BH101-0.16-0.3	✓	✓	✓	✓	✓	✓	✓	✓			
BH101-0.8-1											✓
BH101-1.3-1.5											✓
BH102-0.05-0.25	✓	✓	✓	✓	✓	✓	✓	✓			
BH102-0.5-0.8											✓
BH103-0.05-0.2	✓	✓	✓	✓	✓	✓	✓	✓			
BH103-0.3-0.5											✓
BH103-0.5-0.9											✓
BH104-0.05-0.2	✓	✓	✓	✓	✓	✓	✓	✓			
BH104-0.5-0.95											✓
BH105-0.05-0.2	✓	✓	✓	✓	✓	✓	✓	✓			
BH105-0.4-0.5											✓
BH105-0.7-1											✓
BH106-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
BH106-0.35-0.7											✓
TP107-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
TP107-0.1-0.2											✓
TP107-0.4-0.5											✓
TP107-0.9-1.1											✓
TP108-0-0.1											✓
TP108-04-0.5	✓	✓	✓	✓	✓	✓	✓	✓			
TP108-0.8-0.9											✓
BH109-0.03-0.2	✓	✓	✓	✓	✓	✓	✓	✓			
BH109-0.5-0.95											✓
TP110-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
TP110-0.3-0.4											✓
TP110-1.0-1.1											✓
TP111-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
TP111-0.5-0.6											✓
TP111-0.9-1											✓
TP112-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
TP112-0.8-0.9											✓

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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	Asbestos ID - materials	Asbestos in Water*	On Hold
TP112-1.3-1.4											✓
TP113-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			
TP113-0.7-0.8											✓
SDUP101	✓	✓	✓	✓	✓	✓	✓				
SDUP102	✓	✓	✓	✓	✓	✓	✓				
TS-101	✓										
TS-102	✓										
TB-101	✓	✓	✓				✓				
TB-102	✓	✓	✓				✓				
FR101-HA										✓	
FCF101									✓		

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: E36287BL Date Results Required: STANDARD Page: 1 of 2	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Harry Leonard hleonard@jkenvironments.com.au

Location: Campbelltown, NSW

Sampler: OB / AD

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6aNEPM	Combo 6	Combo 6a	Combo 3	Asbestos (detection)	BTEX						
20/05/2024	1	BH101	0.16-0.3	G, A	0	F: Silty Sand	X											
20/05/2024	2	BH101	0.8-1	G, A	0.1	Silty Clay												
20/05/2024	3	BH101	1.3-1.5	G, A	0	Silty Clay												
20/05/2024	4	BH102	0.05-0.25	G, A	0.3	F: Silty Sand	X											
20/05/2024	5	BH102	0.5-0.8	G, A	0	Silty Clay												
20/05/2024	6	BH103	0.05-0.2	G, A	0	F: Silty Sand	X											
20/05/2024	7	BH103	0.3-0.5	G, A	0.2	F: Silty Clay												
20/05/2024	8	BH103	0.5-0.9	G, A	0.2	Silty Clay												
20/05/2024	9	BH104	0.05-0.2	G, A	0.2	F: Silty Sand	X											
20/05/2024	10	BH104	0.5-0.95	G, A	0.2	Silty Clay												
20/05/2024	11	BH105	0.05-0.2	G, A	0.3	F: Silty Sand	X											
20/05/2024	12	BH105	0.4-0.5	G, A	0.2	F: Silty Clay												
20/05/2024	13	BH105	0.7-1	G, A	0.4	Siltstone												
21/05/2024	14	BH106	0-0.1	G, A	0.2	F: Silty Clay	X											
21/05/2024	15	BH106	0.35-0.7	G, A	0.6	Silty Clay												
20/05/2024	16	TP107	0-0.1	G, A	0.2	F: Silty Clay	X											
20/05/2024	17	TP107	0.1-0.2	G, A	0.4	F: Clayey Sandy Gravel												
20/05/2024	18	TP107	0.4-0.5	G, A	0.2	F: Silty Clay												
20/05/2024	19	TP107	0.9-1.1	G, A	0.1	Silty Clay												
20/05/2024	20	TP108	0-0.1	G, A	0.1	F: Silty Clay												
20/05/2024	21	TP108	04-0.5	G, A	0.2	F: Silty Clay	X											
20/05/2024	22	TP108	0.8-0.9	G, A	0.3	Silty Clay												
20/05/2024	23	BH109	0.03-0.2	G, A	0.3	F: Silty Sand	X											
20/05/2024	24	BH109	0.5-0.95	G, A	0.5	Silty Clay												

Remarks (comments/detection limits required):	Sample Containers:
Please hold samples for second round of analysis.	G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By: HL	Date: 21/05/2024	Time:	Received By:	Date:
HL				

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

Job No: 351818

Date Received: 21/5/24
Time Received: 1550
Received By: EW
Temp: Cool/Ambient
Cooling: Ice/Icepack 8°C.
Security: Intact/Broken/None

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: E36287BL Date Results Required: STANDARD Page: 2 of 2	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Harry Leonard hleonard@jkenvironments.com.au

Location: Campbelltown, NSW — Sample Preserved in Esky on Ice

Sampler: OB / AD — Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6aNEPM	Combo 6	Combo 6a	Combo 3	Asbestos (detection)	BTEX						
20/05/2024	25	TP110	0-0.1	G, A	0.2	F: Silty Clay	X											
20/05/2024	26	TP110	0.3-0.4	G, A	0.2	F: Silty Clay												
20/05/2024	27	TP110	1.0-1.1	G, A	0.4	Silty Clay												
20/05/2024	28	TP111	0-0.1	G, A	0.3	F: Silty Sandy Clay	X											
20/05/2024	29	TP111	0.5-0.6	G, A	0.4	F: Silty Clay												
20/05/2024	30	TP111	0.9-1	G, A	0.3	Silty Clay												
20/05/2024	31	TP112	0-0.1	G, A	0.1	F: Silty Clay	X											
20/05/2024	32	TP112	0.8-0.9	G, A	0.2	F: Silty Clay												
20/05/2024	33	TP112	1.3-1.4	G, A	0.3	Silty Clay												
20/05/2024	34	TP113	0-0.1	G, A	0.4	F: Silty Clay	X											
20/05/2024	35	TP113	0.7-0.8	G, A	0.5	F: Silty Clay												
20/05/2024	36	SDUP101	-	G	-	Soil		X										
20/05/2024	37	SDUP102	-	G	-	Soil		X										
20/05/2024	38	TS-101	-	V	-	Trip spike						X						
20/05/2024	39	TS-102	-	V	-	Trip spike						X						
20/05/2024	40	TB-101	-	V	-	Trip blank				X								
20/05/2024	41	TB-102	-	V	-	Trip blank				X								
21/05/2024	42	FR101-HA	-	V	-	Water					X							
20/05/2024	43	FCF101	-	A	-	Fibre cement					X							

Remarks (comments/detection limits required):	Sample Containers:
Please hold samples for second round of analysis.	G - 250mg Glass Jar A - Ziplock Asbestos Bag v - Vial

Relinquished By: HL	Date: 21/05/2024	Time:	Received By:	Date:

351818
21/5
EW

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CERTIFICATE OF ANALYSIS 351818-A

Client Details

Client	JK Environments
Attention	Harry Leonard
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36287BL Campbelltown**
Number of Samples	Additional analysis
Date samples received	21/05/2024
Date completed instructions received	29/05/2024

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	05/06/2024
Date of Issue	05/06/2024

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Giovanni Agosti, Group Technical Manager
Jenny He, Senior Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		351818-A-5	351818-A-19	351818-A-24	351818-A-27	351818-A-33
Your Reference	UNITS	BH102	TP107	BH109	TP110	TP112
Depth		0.5-0.8	0.9-1.1	0.5-0.95	1.0-1.1	1.3-1.4
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2024	30/05/2024	30/05/2024	30/05/2024	30/05/2024
Date analysed	-	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
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	%	78	92	86	91	77

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		351818-A-35
Your Reference	UNITS	TP113
Depth		0.7-0.8
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	30/05/2024
Date analysed	-	31/05/2024
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	75

svTRH (C10-C40) in Soil						
Our Reference		351818-A-5	351818-A-19	351818-A-24	351818-A-27	351818-A-33
Your Reference	UNITS	BH102	TP107	BH109	TP110	TP112
Depth		0.5-0.8	0.9-1.1	0.5-0.95	1.0-1.1	1.3-1.4
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2024	30/05/2024	30/05/2024	30/05/2024	30/05/2024
Date analysed	-	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
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	%	92	90	91	91	88

svTRH (C10-C40) in Soil		
Our Reference		351818-A-35
Your Reference	UNITS	TP113
Depth		0.7-0.8
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	30/05/2024
Date analysed	-	31/05/2024
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	<50
TRH >C_{10}-C_{16}	mg/kg	<50
TRH >C_{10}-C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16}-C_{34}	mg/kg	<100
TRH >C_{34}-C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	90

PAHs in Soil						
Our Reference		351818-A-5	351818-A-19	351818-A-24	351818-A-27	351818-A-33
Your Reference	UNITS	BH102	TP107	BH109	TP110	TP112
Depth		0.5-0.8	0.9-1.1	0.5-0.95	1.0-1.1	1.3-1.4
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2024	30/05/2024	30/05/2024	30/05/2024	30/05/2024
Date analysed	-	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
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	0.09	<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	0.09	<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	%	110	111	112	113	111

PAHs in Soil		
Our Reference		351818-A-35
Your Reference	UNITS	TP113
Depth		0.7-0.8
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	30/05/2024
Date analysed	-	31/05/2024
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	110

Acid Extractable metals in soil						
Our Reference		351818-A-5	351818-A-19	351818-A-24	351818-A-27	351818-A-33
Your Reference	UNITS	BH102	TP107	BH109	TP110	TP112
Depth		0.5-0.8	0.9-1.1	0.5-0.95	1.0-1.1	1.3-1.4
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
Date analysed	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024	03/06/2024
Arsenic	mg/kg	<4	8	5	5	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	18	13	14	14
Copper	mg/kg	28	33	33	34	29
Lead	mg/kg	15	27	18	19	20
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	13	9	8	8
Zinc	mg/kg	24	58	40	41	43

Acid Extractable metals in soil		
Our Reference		351818-A-35
Your Reference	UNITS	TP113
Depth		0.7-0.8
Date Sampled		20/05/2024
Type of sample		Soil
Date prepared	-	31/05/2024
Date analysed	-	03/06/2024
Arsenic	mg/kg	6
Cadmium	mg/kg	<0.4
Chromium	mg/kg	15
Copper	mg/kg	33
Lead	mg/kg	93
Mercury	mg/kg	0.1
Nickel	mg/kg	10
Zinc	mg/kg	81

CEC			
Our Reference		351818-A-1	351818-A-24
Your Reference	UNITS	BH101	BH109
Depth		0.16-0.3	0.5-0.95
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date prepared	-	05/06/2024	05/06/2024
Date analysed	-	05/06/2024	05/06/2024
Exchangeable Ca	meq/100g	16	7.7
Exchangeable K	meq/100g	0.3	0.7
Exchangeable Mg	meq/100g	4.5	6.4
Exchangeable Na	meq/100g	0.5	1.5
Cation Exchange Capacity	meq/100g	21	16

Misc Inorg - Soil			
Our Reference		351818-A-1	351818-A-24
Your Reference	UNITS	BH101	BH109
Depth		0.16-0.3	0.5-0.95
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date prepared	-	29/05/2024	29/05/2024
Date analysed	-	31/05/2024	31/05/2024
pH 1:5 soil:water	pH Units	9.0	8.2

Clay 50-120g			
Our Reference		351818-A-1	351818-A-24
Your Reference	UNITS	BH101	BH109
Depth		0.16-0.3	0.5-0.95
Date Sampled		20/05/2024	20/05/2024
Type of sample		Soil	Soil
Date prepared	-	31/05/2024	31/05/2024
Date analysed	-	03/06/2024	03/06/2024
Clay in soils <2µm	% (w/w)	7	60

Moisture						
Our Reference		351818-A-5	351818-A-19	351818-A-24	351818-A-27	351818-A-33
Your Reference	UNITS	BH102	TP107	BH109	TP110	TP112
Depth		0.5-0.8	0.9-1.1	0.5-0.95	1.0-1.1	1.3-1.4
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/05/2024	30/05/2024	30/05/2024	30/05/2024	30/05/2024
Date analysed	-	31/05/2024	31/05/2024	31/05/2024	31/05/2024	31/05/2024
Moisture	%	15	21	19	20	18

Moisture		
Our Reference		351818-A-35
Your Reference	UNITS	TP113
Depth		0.7-0.8
Date Sampled		20/05/2024
Type of sample		Soil
Date prepared	-	30/05/2024
Date analysed	-	31/05/2024
Moisture	%	18

Metals from Leaching Fluid pH 2.9 or 5						
Our Reference		351818-A-1	351818-A-16	351818-A-23	351818-A-25	351818-A-31
Your Reference	UNITS	BH101	TP107	BH109	TP110	TP112
Depth		0.16-0.3	0-0.1	0.03-0.2	0-0.1	0-0.1
Date Sampled		20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024	03/06/2024
Date analysed	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024	03/06/2024
pH of soil for fluid# determ.	pH units	9.4	8.5	9.5	9.1	8.1
pH of soil TCLP (after HCl)	pH units	1.8	1.7	1.7	1.7	1.7
Extraction fluid used		1	1	1	1	1
pH of final Leachate	pH units	5.0	4.9	5.2	5.0	4.9
Lead	mg/L	[NA]	<0.03	[NA]	<0.03	0.03
Nickel	mg/L	0.2	[NA]	0.08	[NA]	[NA]

Metals from Leaching Fluid pH 2.9 or 5		
Our Reference		351818-A-34
Your Reference	UNITS	TP113
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	03/06/2024
Date analysed	-	03/06/2024
pH of soil for fluid# determ.	pH units	7.9
pH of soil TCLP (after HCl)	pH units	1.8
Extraction fluid used		1
pH of final Leachate	pH units	4.9
Lead	mg/L	0.05

Method ID	Methodology Summary
AS1289.3.6.3	Particle Size Distribution using in house method INORG-107 by way of sieving and/or hydrometer sedimentation testing. Clay fraction at <2µm reported.
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439. Please note that the mass used may be scaled down from default based on sample mass available. Samples are stored at 2-6oC before and after leachate preparation.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of various metals by ICP-AES following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			30/05/2024	[NT]	[NT]	[NT]	[NT]	30/05/2024	[NT]
Date analysed	-			31/05/2024	[NT]	[NT]	[NT]	[NT]	31/05/2024	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	73	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	73	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	64	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	84	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	70	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	73	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	109	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			30/05/2024	[NT]	[NT]	[NT]	[NT]	30/05/2024	[NT]
Date analysed	-			31/05/2024	[NT]	[NT]	[NT]	[NT]	31/05/2024	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	128	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[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]	128	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	89	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date extracted	-			30/05/2024	[NT]	[NT]	[NT]	[NT]	30/05/2024	[NT]
Date analysed	-			31/05/2024	[NT]	[NT]	[NT]	[NT]	31/05/2024	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	114	[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]	114	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	118	[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]	120	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	118	[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]	112	[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]	106	[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	115	[NT]	[NT]	[NT]	[NT]	113	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			31/05/2024	[NT]	[NT]	[NT]	[NT]	31/05/2024	[NT]
Date analysed	-			03/06/2024	[NT]	[NT]	[NT]	[NT]	03/06/2024	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	351818-A-24
Date prepared	-			05/06/2024	1	05/06/2024	05/06/2024		05/06/2024	05/06/2024
Date analysed	-			05/06/2024	1	05/06/2024	05/06/2024		05/06/2024	05/06/2024
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	1	16	12	29	93	112
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	1	0.3	0.2	40	100	97
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	1	4.5	3.6	22	93	112
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	1	0.5	0.4	22	111	107

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			29/05/2024	[NT]	[NT]	[NT]	[NT]	29/05/2024	[NT]
Date analysed	-			31/05/2024	[NT]	[NT]	[NT]	[NT]	31/05/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: Metals from Leaching Fluid pH 2.9 or 5					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	351818-A-16
Date extracted	-			03/06/2024	1	03/06/2024	03/06/2024		03/06/2024	03/06/2024
Date analysed	-			03/06/2024	1	03/06/2024	03/06/2024		03/06/2024	03/06/2024
Lead	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	107	93
Nickel	mg/L	0.02	Metals-020	<0.02	1	0.2	0.2	0	106	91

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

Report Comments
Samples were out of the recommended holding time for this analysis. pH/EC

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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Harry Leonard

Sample Login Details	
Your reference	E36287BL Campbelltown
Envirolab Reference	351818-A
Date Sample Received	21/05/2024
Date Instructions Received	29/05/2024
Date Results Expected to be Reported	05/06/2024

Sample Condition	
Samples received in appropriate condition for analysis	Holding time exceedance
No. of Samples Provided	Additional analysis
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Holding time exceedance pH

Please contact the laboratory within 24 hours if you wish to cancel the aformentioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	CEC	Misc Inorg - Soil	Clay 50-120g	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Lead	Nickel	On Hold
BH101-0.16-0.3					✓	✓	✓	✓	✓	✓	✓		✓	
BH101-0.8-1														✓
BH101-1.3-1.5														✓
BH102-0.05-0.25														✓
BH102-0.5-0.8	✓	✓	✓	✓										
BH103-0.05-0.2														✓
BH103-0.3-0.5														✓
BH103-0.5-0.9														✓
BH104-0.05-0.2														✓
BH104-0.5-0.95														✓
BH105-0.05-0.2														✓
BH105-0.4-0.5														✓
BH105-0.7-1														✓
BH106-0-0.1														✓
BH106-0.35-0.7														✓
TP107-0-0.1								✓	✓	✓	✓	✓		
TP107-0.1-0.2														✓
TP107-0.4-0.5														✓
TP107-0.9-1.1	✓	✓	✓	✓										
TP108-0-0.1														✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	CEC	Misc Inorg - Soil	Clay 50-120g	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Lead	Nickel	On Hold
TP108-04-0.5														✓
TP108-0.8-0.9														✓
BH109-0.03-0.2								✓	✓	✓	✓		✓	
BH109-0.5-0.95	✓	✓	✓	✓	✓	✓	✓							
TP110-0-0.1								✓	✓	✓	✓	✓		
TP110-0.3-0.4														✓
TP110-1.0-1.1	✓	✓	✓	✓										
TP111-0-0.1														✓
TP111-0.5-0.6														✓
TP111-0.9-1														✓
TP112-0-0.1								✓	✓	✓	✓	✓		
TP112-0.8-0.9														✓
TP112-1.3-1.4	✓	✓	✓	✓										
TP113-0-0.1								✓	✓	✓	✓	✓		
TP113-0.7-0.8	✓	✓	✓	✓										
SDUP101														✓
SDUP102														✓
TS-101														✓
TS-102														✓
TB-101														✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	CEC	Misc Inorg - Soil	Clay 50-120g	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Lead	Nickel	On Hold
TB-102														✓
FR101-HA														✓
FCF101														✓
TP111 - [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.

Anna Bui

From:	Harry Leonard <HLeonard@jkenvironments.com.au>
Sent:	Wednesday, 29 May 2024 1:20 PM
To:	Samplereceipt
Cc:	Stuart Chen; Customer Service
Subject:	RE: Results for Registration 351818 E36287BL Campbelltown

Good afternoon,

Could I please schedule the following samples for additional analysis:

The following for pH/CEC/clay content (%):
1 - BH101 (0.16-0.3)
24 - BH109 (0.5-0.95)

The following for Combo #3:
5 - BH102 (0.5-0.8)
19 - TP107 (0.9-1.1)
24 - BH109 (0.5-0.95)
27 - TP110 (1.0-1.1)
33 - TP112 (1.3-1.4)
35 - TP113 (0.7-0.8)

ELS REF: 351818-A
TAT: STANDARD
DUE: 5/6/24
AB-

The following for TCLP lead:
16 - TP107 (0-0.1)
25 - TP110 (0-0.1)
31 - TP112 (0-0.1)
34 - TP113 (0-0.1)

The following for TCLP nickel:
1 - BH101 (0.16-0.3)
23 - BH109 (0.03-0.2)

Any questions or issues, please let me know.

Thank you.

Regards
Harry Leonard
Associate | Environmental Scientist
NSW Licensed Asbestos Assessor

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JKEnvironments

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CERTIFICATE OF ANALYSIS 351818-B

Client Details

Client	JK Environments
Attention	Harry Leonard
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36287BL Campbelltown**
Number of Samples	Additional analysis 1 sample
Date samples received	21/05/2024
Date completed instructions received	06/06/2024

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	14/06/2024
Date of Issue	13/06/2024

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Asbestos Approved By
Analysed by Asbestos Approved Analyst: Sneha Shakya
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Giovanni Agosti, Group Technical Manager
Liam Timmins, Organics Supervisor
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		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	12/06/2024
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	80

svTRH (C10-C40) in Soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	08/06/2024
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	<50
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	91

PAHs in Soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	11/06/2024
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	93

Organochlorine Pesticides in soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	11/06/2024
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
Surrogate 4-Chloro-3-NBTF	%	87

Organophosphorus Pesticides in Soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	11/06/2024
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	%	87

PCBs in Soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date extracted	-	07/06/2024
Date analysed	-	11/06/2024
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	%	93

Acid Extractable metals in soil		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date prepared	-	07/06/2024
Date analysed	-	07/06/2024
Arsenic	mg/kg	7
Cadmium	mg/kg	<0.4
Chromium	mg/kg	13
Copper	mg/kg	26
Lead	mg/kg	110
Mercury	mg/kg	0.1
Nickel	mg/kg	9
Zinc	mg/kg	120

Moisture		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date prepared	-	07/06/2024
Date analysed	-	10/06/2024
Moisture	%	27

Asbestos ID - soils NEPM - ASB-001		
Our Reference		351818-B-20
Your Reference	UNITS	TP108
Depth		0-0.1
Date Sampled		20/05/2024
Type of sample		Soil
Date analysed	-	13/06/2024
Sample mass tested	g	417.25
Sample Description	-	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
Trace Analysis	-	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected
ACM >7mm Estimation*	g	–
FA and AF Estimation*	g	–
ACM >7mm Estimation*	%(w/w)	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001
Asbestos comments	-	Nil

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 and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	103	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	91	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	113	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	92	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-020	80	[NT]	[NT]	[NT]	[NT]	83	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	94	[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]	112	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	102	[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]	94	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	94	[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]	88	[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]	100	[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	87	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	89	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	140	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Fenthion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
Phosalone	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	89	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Aroclor 1016	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Aroclor 1260	mg/kg	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	86	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-12	[NT]
Date prepared	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	110	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	114	[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

Samples were out of the recommended holding time for this analysis. TRH/BTEX/PAH/OCP/OPP

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.

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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Harry Leonard

Sample Login Details	
Your reference	E36287BL Campbelltown
Envirolab Reference	351818-B
Date Sample Received	21/05/2024
Date Instructions Received	06/06/2024
Date Results Expected to be Reported	14/06/2024

Sample Condition	
Samples received in appropriate condition for analysis	Holding time exceedance
No. of Samples Provided	Additional analysis 1 sample
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Please contact the laboratory within 24 hours if you wish to cancel the aformentioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	On Hold
BH101-0.16-0.3									✓
BH101-0.8-1									✓
BH101-1.3-1.5									✓
BH102-0.05-0.25									✓
BH102-0.5-0.8									✓
BH103-0.05-0.2									✓
BH103-0.3-0.5									✓
BH103-0.5-0.9									✓
BH104-0.05-0.2									✓
BH104-0.5-0.95									✓
BH105-0.05-0.2									✓
BH105-0.4-0.5									✓
BH105-0.7-1									✓
BH106-0-0.1									✓
BH106-0.35-0.7									✓
TP107-0-0.1									✓
TP107-0.1-0.2									✓
TP107-0.4-0.5									✓
TP107-0.9-1.1									✓
TP108-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
TP108-04-0.5									✓
TP108-0.8-0.9									✓
BH109-0.03-0.2									✓
BH109-0.5-0.95									✓
TP110-0-0.1									✓
TP110-0.3-0.4									✓
TP110-1.0-1.1									✓
TP111-0-0.1									✓
TP111-0.5-0.6									✓
TP111-0.9-1									✓
TP112-0-0.1									✓
TP112-0.8-0.9									✓

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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	On Hold
TP112-1.3-1.4									✓
TP113-0-0.1									✓
TP113-0.7-0.8									✓
SDUP101									✓
SDUP102									✓
TS-101									✓
TS-102									✓
TB-101									✓
TB-102									✓
FR101-HA									✓
FCF101									✓
TP111 - [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.

Anna Bui

From: Harry Leonard <HLeonard@jkenvironments.com.au>
Sent: Thursday, 6 June 2024 11:43 AM
To: Aileen Hie; Samplereceipt
Cc: Stuart Chen
Subject: RE: Results for Registration 351818 E36287BL Campbelltown

Hi Aileen,

That's fine. Could you please proceed with the analysis for #6aNEPM?

Standard TA is fine.

ELS REF: 351818-B
TAT: STANDARD
D/E: 14/6/24
AB.

Regards
Harry Leonard
Associate | Environmental Scientist
NSW Licensed Asbestos Assessor

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JKEnvironments

From: Aileen Hie <AHie@envirolab.com.au>
Sent: Thursday, 6 June 2024 11:41 AM
To: Harry Leonard <HLeonard@jkenvironments.com.au>; Samplereceipt <Samplereceipt@envirolab.com.au>
Cc: Stuart Chen <SChen2@envirolab.com.au>
Subject: RE: Results for Registration 351818 E36287BL Campbelltown

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Hi Harry

It's only a few days out for the organics. We can still test but will need to include a comment in the report.

Kind Regards,

Aileen Hie | Customer Service Supervisor | Envirolab Services
(Monday to Friday 10am to 6pm)

Great Science. Great Service.

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

From: Harry Leonard <HLeonard@jkenvironments.com.au>
Sent: Thursday, June 6, 2024 10:08 AM
To: Samplereceipt <Samplereceipt@envirolab.com.au>
Cc: Stuart Chen <SChen2@envirolab.com.au>
Subject: RE: Results for Registration 351818 E36287BL Campbelltown

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Morning,

20
If we scheduled TP108 (0-0.1) for Combo #6aNEPM, would these results be too far outside of the holding time to be reported accurately?

Regards
Harry Leonard
Associate | Environmental Scientist
NSW Licensed Asbestos Assessor

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NORTH RYDE BC NSW 1670
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MACQUARIE PARK NSW 2113

JKEnvironments

From: Stuart Chen <SChen2@envirolab.com.au>
Sent: Tuesday, 28 May 2024 5:04 PM
To: Harry Leonard <HLeonard@jkenvironments.com.au>
Subject: Results for Registration 351818 E36287BL Campbelltown

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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

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
customerservice@envirolab.com.au

How did we do? Send Feedback

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

CERTIFICATE OF ANALYSIS 352349

Client Details

Client	JK Environments
Attention	Harry Leonard
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36287BL, Campbelltown**
Number of Samples	5 Water
Date samples received	27/05/2024
Date completed instructions received	27/05/2024

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	03/06/2024
Date of Issue	30/05/2024

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Results Approved By
Giovanni Agosti, Group Technical Manager
Jenny He, Senior Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		352349-1	352349-2	352349-3	352349-4	352349-5
Your Reference	UNITS	MW1	MW2	WDUP101	TB-W101	TS-W101
Date Sampled		27/05/2024	27/05/2024	27/05/2024	27/05/2024	27/05/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Date analysed	-	29/05/2024	29/05/2024	29/05/2024	29/05/2024	30/05/2024
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	<1	102%
Toluene	µg/L	<1	<1	<1	<1	96%
Ethylbenzene	µg/L	<1	<1	<1	<1	100%
m+p-xylene	µg/L	<2	<2	<2	<2	94%
o-xylene	µg/L	<1	<1	<1	<1	90%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	107	111	110	112	106
Surrogate Toluene-d8	%	98	98	97	95	103
Surrogate 4-Bromofluorobenzene	%	101	100	99	102	95

svTRH (C10-C40) in Water					
Our Reference		352349-1	352349-2	352349-3	352349-4
Your Reference	UNITS	MW1	MW2	WDUP101	TB-W101
Date Sampled		27/05/2024	27/05/2024	27/05/2024	27/05/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Date analysed	-	29/05/2024	29/05/2024	29/05/2024	29/05/2024
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	150
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	150
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	150
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	150
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	150
Surrogate o-Terphenyl	%	95	104	83	74

PAHs in Water					
Our Reference		352349-1	352349-2	352349-3	352349-4
Your Reference	UNITS	MW1	MW2	WDUP101	TB-W101
Date Sampled		27/05/2024	27/05/2024	27/05/2024	27/05/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Date analysed	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	105	107	105	97

HM in water - dissolved					
Our Reference		352349-1	352349-2	352349-3	352349-4
Your Reference	UNITS	MW1	MW2	WDUP101	TB-W101
Date Sampled		27/05/2024	27/05/2024	27/05/2024	27/05/2024
Type of sample		Water	Water	Water	Water
Date prepared	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Date analysed	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	7	<1	<1
Zinc-Dissolved	µg/L	2	24	2	<1

Miscellaneous Inorganics			
Our Reference		352349-1	352349-2
Your Reference	UNITS	MW1	MW2
Date Sampled		27/05/2024	27/05/2024
Type of sample		Water	Water
Date prepared	-	27/05/2024	27/05/2024
Date analysed	-	27/05/2024	27/05/2024
pH	pH Units	7.7	6.3
Electrical Conductivity	µS/cm	1,600	11,000

Cations in water Dissolved			
Our Reference		352349-1	352349-2
Your Reference	UNITS	MW1	MW2
Date Sampled		27/05/2024	27/05/2024
Type of sample		Water	Water
Date digested	-	28/05/2024	28/05/2024
Date analysed	-	29/05/2024	29/05/2024
Calcium - Dissolved	mg/L	4	360
Magnesium - Dissolved	mg/L	8.6	250
Hardness (calc) equivalent $CaCO_3$	mg/L	46	1,900

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determined stoichiometrically from the base metal concentration.
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-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-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			28/05/2024	1	28/05/2024	29/05/2024		28/05/2024	[NT]
Date analysed	-			30/05/2024	1	29/05/2024	30/05/2024		29/05/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	103	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	103	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	102	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	103	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	104	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	102	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	1	107	111	4	95	[NT]
Surrogate Toluene-d8	%		Org-023	96	1	98	98	0	102	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	102	1	101	101	0	96	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	352349-2
Date extracted	-			28/05/2024	1	28/05/2024	28/05/2024		28/05/2024	28/05/2024
Date analysed	-			29/05/2024	1	29/05/2024	29/05/2024		29/05/2024	29/05/2024
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	112	109
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	113	115
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	100	98
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	112	109
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	113	115
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	100	98
Surrogate o-Terphenyl	%		Org-020	100	1	95	81	16	101	109

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			28/05/2024	1	28/05/2024	28/05/2024		28/05/2024	[NT]
Date analysed	-			28/05/2024	1	28/05/2024	28/05/2024		28/05/2024	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	87	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	109	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	115	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	108	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	75	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	89	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	100	1	105	99	6	100	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			28/05/2024	2	28/05/2024	28/05/2024		28/05/2024	[NT]
Date analysed	-			28/05/2024	2	28/05/2024	28/05/2024		28/05/2024	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	103	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	2	<0.1	<0.1	0	91	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	95	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	91	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	99	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	2	<0.05	[NT]		116	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	2	7	7	0	90	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	2	24	26	8	93	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Date analysed	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: Cations in water Dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			28/05/2024	[NT]	[NT]	[NT]	[NT]	28/05/2024	[NT]
Date analysed	-			29/05/2024	[NT]	[NT]	[NT]	[NT]	29/05/2024	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	95	[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

TRH Water(C10-C40) NEPM - The positive result in the blank/rinsate sample is due to a single peak with no hydrocarbon profile that is consistent with the use of plastic containers.

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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Harry Leonard

Sample Login Details	
Your reference	E36287BL, Campbelltown
Envirolab Reference	352349
Date Sample Received	27/05/2024
Date Instructions Received	27/05/2024
Date Results Expected to be Reported	03/06/2024

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	5 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11
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
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	HM in water - dissolved	pH	Electrical Conductivity	Cations in water Dissolved
MW1	✓	✓	✓	✓	✓	✓	✓
MW2	✓	✓	✓	✓	✓	✓	✓
WDUP101	✓	✓	✓	✓			
TB-W101	✓	✓	✓	✓			
TS-W101	✓						

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: E36287BL 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: Harry Leonard hleonard@jkenvironments.com.au

Location: Campbelltown — Sample Preserved in Esky on Ice

Sampler: AD — Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 3	EC/pH	Hardness	BTEX								
27/05/2024	1	MW1	2x amber, 2x BTEX, 1x HNO3, 1x PVC	0.1	Water	X	X	X									
27/05/2024	2	MW2	2x amber, 2x BTEX, 1x HNO3, 1x PVC	3.2	Water	X	X	X									
27/05/2024	3	WDUP101	2x amber, 2x BTEX, 1x HNO3	-	Duplicate	X											
27/05/2024	S/o	WDUP102	2x amber, 2x BTEX, 1x HNO3	-	Duplicate	X			Please send to Envirolab VIC								
27/05/2024	4	TB-W101	2x amber, 2x BTEX, 1x HNO3	-	Trip Blank	X											
27/05/2024	5	TS-W101	1x BTEX	-	Trip Spike				X								

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 352349
Date Received: 27/5/24
Time Received: 1515
Received By: KW
Temp: Cool/Ambient
Cooling: Ice/Icepack 11°C
Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers:
All analysis PQLs to ANZECC (2000) Detection Limits Please	G1 - 500mL Amber Glass Bottle G2 - 1L Amber Glass Bottle V - BTEX Vial H - HNO3 Wash PVC PVC - HDPE Plastic Bottles

Relinquished By: AD	Date: 27/05/24	Time: 1pm	Received By: Katy Wayne ELS SYP	Date: 27/5/24 1515

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph +61 3 9763 2500
melbourne@envirolab.com.au
www.envirolab.com.au

Certificate of Analysis MFE0589

Client Details

Client	JK Environments
Contact	Harry Leonard
Address	115 Wicks Road, Macquarie Park, NSW, 2113

Sample Details

Your Reference	E36287BL
Number of Samples	1 Water
Date Samples Received	29/05/2024
Date Instructions Received	29/05/2024

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	04/06/2024
Date of Issue	04/06/2024

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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, Senior Chemist
Laboratory Manager	Pamela Adams

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
MFE0589-01	WDUP102	Water	27/05/2024	29/05/2024

Volatile TRH and BTEX (Water)

Envirolab ID	Units	PQL	MFE0589-01
Your Reference			WDUP102
Date Sampled			27/05/2024
TRH C6-C9	µg/L	10	<10
TRH C6-C10	µg/L	10	<10
TRH C6-C10 less BTEX (F1)	µg/L	10	<10
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0
Benzene	µg/L	1.0	<1.0
Toluene	µg/L	1.0	<1.0
Ethylbenzene	µg/L	1.0	<1.0
meta+para Xylene	µg/L	2.0	<2.0
ortho-Xylene	µg/L	1.0	<1.0
Total Xylene	µg/L	3.0	<3.0
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0
Surrogate Dibromofluoromethane	%		*112*
Surrogate Toluene-D8	%		*110*
Surrogate 4-Bromofluorobenzene	%		*101*

Semi-volatile TRH (Water)

Envirolab ID	**Units**	**PQL**	MFE0589-01
Your Reference			WDUP102
Date Sampled			27/05/2024
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	100	<100
TRH C29-C36	µg/L	100	<100
Total +ve TRH C10-C36	µg/L	50	<50
TRH >C10-C16	µg/L	50	<50
TRH >C10-C16 less Naphthalene F2	µg/L	50	<50
TRH >C16-C34 (F3)	µg/L	100	<100
TRH >C34-C40 (F4)	µg/L	100	<100
Total +ve TRH >C10-C40	µg/L	50	<50
Surrogate o-Terphenyl	%		*78.4*

Polycyclic Aromatic Hydrocarbons (Water)

Envirolab ID	Units	PQL	MFE0589-01
Your Reference			WDUP102
Date Sampled			27/05/2024
Naphthalene	µg/L	0.10	<0.10
Acenaphthylene	µg/L	0.10	<0.10
Acenaphthene	µg/L	0.10	<0.10
Fluorene	µg/L	0.10	<0.10
Phenanthrene	µg/L	0.10	<0.10
Anthracene	µg/L	0.10	<0.10
Fluoranthene	µg/L	0.10	<0.10
Pyrene	µg/L	0.10	<0.10
Benzo(a)anthracene	µg/L	0.10	<0.10
Chrysene	µg/L	0.10	<0.10
Benzo(b,j,k)fluoranthene	µg/L	0.20	<0.20
Benzo(a)pyrene	µg/L	0.10	<0.10
Indeno(1,2,3-c,d)pyrene	µg/L	0.10	<0.10
Dibenzo(a,h)anthracene	µg/L	0.10	<0.10
Benzo(g,h,i)perylene	µg/L	0.10	<0.10
Total +ve PAH	µg/L	0.10	<0.10
Surrogate p-Terphenyl-D14	%		*79.8*

Dissolved Low Level Metals (Water)

Envirolab ID	Units	PQL	MFE0589-01
Your Reference			WDUP102
Date Sampled			27/05/2024
Arsenic	µg/L	1.0	<2.0
Cadmium	µg/L	0.10	<0.20
Chromium	µg/L	1.0	<2.0
Copper	µg/L	1.0	<2.0
Mercury	µg/L	0.050	<0.050
Nickel	µg/L	1.0	7.8
Lead	µg/L	1.0	<2.0
Zinc	µg/L	1.0	22

Method Summary

Method ID	Methodology Summary
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS.Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements.Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO3) are determined stoichiometrically from the base metal concentration.
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_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 is 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 MFE0589

Client Details

Client	JK Environments
Your Reference	E36287BL
Date Issued	04/06/2024

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	No	Duplicate Outliers Exist - See detailed list below
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 MFE0589

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
vTRH&MBTEXN | Water	1	27/05/2024	31/05/2024	01/06/2024	Yes
sTRH | Water	1	27/05/2024	30/05/2024	30/05/2024	Yes
PAH | Water	1	27/05/2024	30/05/2024	31/05/2024	Yes
Dissolved Metals (LL) | Water	1	27/05/2024	30/05/2024	03/06/2024	Yes
Dissolved Metals (LL)-Hg | Water	1	27/05/2024	31/05/2024	03/06/2024	Yes

Outliers: Duplicates

METALS-022|Dissolved Low Level Metals (Water)| Batch BFE5327

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BFE5327-DUP1#	DUP1	Nickel	20.00	200[1]

Outliers: Matrix Spike

ORG-020|Semi-volatile TRH (Water)| Batch BFE5166

Sample ID	Analyte	% Limits	% Recovery
BFE5166-MS1#	TRH >C10-C16	60 - 140	-48.5
BFE5166-MS1#	TRH >C16-C34 (F3)	60 - 140	-77.6
BFE5166-MS1#	TRH >C34-C40 (F4)	60 - 140	-65.5
BFE5166-MS1#	TRH C10-C14	60 - 140	-50.8
BFE5166-MS1#	TRH C15-C28	60 - 140	-74.3
BFE5166-MS1#	TRH C29-C36	60 - 140	-70.1

Quality Control MFE0589

ORG-023_F1_TOT | Volatile TRH and BTEX (Water) | Batch BFE5665

Analyte	Units	PQL	Blank	DUP1 BFE5665-DUP1# Samp | QC | RPD %	DUP2 BFE5665-DUP2# Samp | QC | RPD %	LCS %	Spike % BFE5665-MS2#
TRH C6-C9	µg/L	10	<10	<10 | <10 | [NA]	<10 | <10 | [NA]	86.2	91.3
TRH C6-C10	µg/L	10	<10	<10 | <10 | [NA]	13.7 | 10.2 | 29.3	86.6	92.2
TRH C6-C10 less BTEX (F1)	µg/L	10	<10	<10 | <10 | [NA]	13.6 | 10.1 | 29.7	[NA]	[NA]
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	[NA]	[NA]
Benzene	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	104	101
Toluene	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	102	99.1
Ethylbenzene	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	81.8	83.9
meta+para Xylene	µg/L	2.0	<2.0	<2.0 | <2.0 | [NA]	<2.0 | <2.0 | [NA]	86.6	89.4
ortho-Xylene	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	82.6	84.5
Total Xylene	µg/L	3.0	<3.0	<3.0 | <3.0 | [NA]	<3.0 | <3.0 | [NA]	[NA]	[NA]
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	[NA]	[NA]
Surrogate Dibromofluoromethane	*%*		*108*	*113 | 114*	*113 | 115*	*107*	*104*
Surrogate Toluene-D8	*%*		*108*	*109 | 111*	*111 | 111*	*109*	*104*
Surrogate 4-Bromofluorobenzene	*%*		*101*	*101 | 102*	*102 | 100*	*105*	*103*

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

ORG-020 | Semi-volatile TRH (Water) | Batch BFE5166

Analyte	Units	PQL	Blank	DUP1 BFE5166-DUP1# Samp | QC | RPD %	LCS %	Spike % BFE5166-MS1#
TRH C10-C14	µg/L	50	<50	<50 | <50 | [NA]	64.7	-50.8
TRH C15-C28	µg/L	100	<100	<100 | <100 | [NA]	98.2	-74.3
TRH C29-C36	µg/L	100	<100	<100 | <100 | [NA]	118	-70.1
TRH >C10-C16	µg/L	50	<50	<50 | <50 | [NA]	60.5	-48.5
TRH >C16-C34 (F3)	µg/L	100	<100	<100 | <100 | [NA]	104	-77.6
TRH >C34-C40 (F4)	µg/L	100	<100	<100 | <100 | [NA]	86.9	-65.5
Surrogate o-Terphenyl	*%*		*92.3*	*83.5 | 72.6*	*83.5*	*75.3*

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

ORG-022_PAH | Polycyclic Aromatic Hydrocarbons (Water) | Batch BFE5166

Analyte	Units	PQL	Blank	DUP1 BFE5166-DUP1# Samp | QC | RPD %	LCS %	Spike % BFE5166-MS2#
Naphthalene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	111
Acenaphthylene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Acenaphthene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	113
Fluorene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	114
Phenanthrene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	109
Anthracene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Fluoranthene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	117
Pyrene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	124
Benzo(a)anthracene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Chrysene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	127
Benzo(b,j,k)fluoranthene	µg/L	0.20	<0.20	<0.20 | <0.20 | [NA]	[NA]	[NA]
Benzo(a)pyrene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	63.5
Indeno(1,2,3-c,d)pyrene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Dibenzo(a,h)anthracene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Benzo(g,h,i)perylene	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	[NA]	[NA]
Surrogate p-Terphenyl-D14	*%*		*90.7*	*78.6 | 65.2*	*98.5*	*78.6*

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

Quality Control MFE0589

METALS-022 | Dissolved Low Level Metals (Water) | Batch BFE5327

Analyte	Units	PQL	Blank	DUP1 BFE5327-DUP1# Samp | QC | RPD %	DUP2 BFE5327-DUP2# Samp | QC | RPD %	LCS %	Spike % BFE5327-MS1#
Arsenic	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	<1.0 | <1.0 | [NA]	110	103
Cadmium	µg/L	0.10	<0.10	<0.20 | <0.20 | [NA]	0.259 | 0.272 | 4.90	112	117
Chromium	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	<1.0 | <1.0 | [NA]	108	106
Copper	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	5.22 | 5.15 | 1.27	104	94.3
Lead	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	2.06 | 2.06 | 0.0485	105	98.1
Nickel	µg/L	1.0	<1.0	3.04 | <2.0 | 200 [1]	1.51 | 1.47 | 3.09	105	91.6
Zinc	µg/L	1.0	<1.0	7.00 | 5.82 | 18.4	346 | 371 | 7.04	112	98.9

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

METALS-021 | Dissolved Low Level Metals (Water) | Batch BFE5500

Analyte	Units	PQL	Blank	DUP1 BFE5500-DUP1# Samp | QC | RPD %	LCS %	Spike % MFE0589-01
Mercury	µg/L	0.050	<0.050	<0.050 | <0.050 | [NA]	101	116

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

QC Comments

Identifier	Description
[1]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Envirolab Services Pty Ltd
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melbourne@envirolab.com.au
www.envirolab.com.au

Sample Receipt Advice MFE0589

Client Details

Client	JK Environments
Attention	Harry Leonard

Sample Login Details

Your Reference	E36287BL
Envirolab Reference	MFE0589
Date Sample Received	29/05/2024
Date Instructions Received	29/05/2024
Date Final Results Expected	04/06/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
Number of Samples	1 Water
Turnaround Time	4 Days
Temperatures / Cooling Methods	14.6°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 MFE0589

Analysis Grid

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

	Combination 3 (D)
MFE0589-01 Water | 27/05/2024 WDUP102	•

Suite Details

Suite Name	Suite Analyses
Combination 3 (D) | Water	vTRH&MBTEXN, sTRH, PAH, As - Dissolved (LL), Cd - Dissolved (LL), Cr - Dissolved (LL), Cu - Dissolved (LL), Hg - Dissolved, Ni - Dissolved (LL), Pb - Dissolved (LL), Zn - Dissolved (LL)

SAMPLE AND CHAIN OF CUSTODY FORM

TO: **ENVIROLAB SERVICES PTY LTD** **12 ASHLEY STREET** **CHATSWOOD NSW 2067** **P: (02) 99106200** **F: (02) 99106201** **Attention: Aileen**	**JKE Job Number:** **E36287BL** **Date Results Required:** **STANDARD** **Page:** 1 of 1	**FROM:** **JKEnvironments** **REAR OF 115 WICKS ROAD** **MACQUARIE PARK, NSW 2113** **P: 02-9888 5000 F: 02-9888 5001** **Attention: Harry Leonard** hleonard@jkenvironments.com.au

Location: Campbelltown
Sampler: AD

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 3	EC/pH	Hardness	BTEX								
27/05/2024	1	MW1	2x amber, 2x BTEX, 1x HNO3, 1x PVC	0.1	Water	X	X	X									
27/05/2024	2	MW2	2x amber, 2x BTEX, 1x HNO3, 1x PVC	3.2	Water	X	X	X									
27/05/2024	3	WDUP101	2x amber, 2x BTEX, 1x HNO3	-	Duplicate	X											
1 27/05/2024	S/O	WDUP102	2x amber, 2x BTEX, 1x HNO3	-	Duplicate	X				Please send to Envirolab VIC							
27/05/2024	4	TB-W101	2x amber, 2x BTEX, 1x HNO3	-	Trip Blank	X											
27/05/2024	5	TS-W101	1x BTEX	-	Trip Spike				X								

ENVIROLAB Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 352349
Date Received: 27/5/24
Time Received: 1515
Received By: KW
Temp: Cool/Ambient
Cooling: Ice/Icepack 11°C
Security: Intact/Broken/None

ENVIROLAB Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph: (03) 9763 2500
Job No: MFE0589
Date Received: 28/05/24
Time Received: 1:00
Received By: ZZ
Temp: Cool/Ambient 14.6°
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

All analysis PQLs to ANZECC (2000) Detection Limits Please

Sample Containers:
G1 - 500mL Amber Glass Bottle G2 - 1L Amber Glass Bottle
V - BTEX Vial H - HNO3 Wash PVC
PVC - HDPE Plastic Bottles

Relinquished By: AD	Date: 27/05/24	Time: 1pm	Received By:	Date:
Christine Ho	28/5/24 1130		Katy Wayne ELS SYD	27/5/24 1515

ELS SYD

Appendix F: 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)[17] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[18]. The NEPM (2013) is consistent with these documents.

A. <u>Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)</u>

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. <u>Precision</u>

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. <u>Accuracy</u>

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. <u>Representativeness</u>

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. <u>Completeness</u>

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;

[17] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[18] 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. <u>Comparability</u>

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. <u>Blanks</u>

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

H. <u>Matrix Spikes</u>

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%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result}) \times 100}{\text{Concentration of Spike Added}}$$

I. <u>Surrogate Spikes</u>

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. <u>Duplicates</u>

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 G: 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 (Appendix I). 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 tables (Table Q1 to Table Q2 inclusive) 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)	2	Approximately 10% of primary samples
Intra-laboratory duplicate (groundwater)	1	Approximately 30% of primary samples
Inter-laboratory duplicate (groundwater)	1	Approximately 30% of primary samples
Trip spikes Soil Water	 2 1	Two soil spikes and one water spike for the investigation to demonstrate adequacy of preservation, storage and transport methods
Trip blanks Soil Water	 2 1	Two soil blanks and one water blank for the investigation to demonstrate adequacy of preservation, storage and transport methods
Rinsate (soil hand 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. There was one RPD non-conformance reported as elevated RPDs for several heavy metals (arsenic, lead, mercury and zinc) in SDUP101/TP108 (0-0.1m). As both the primary and duplicate sample results were less than the SAC, the exceedances are not considered to have had an adverse impact on the data set as a whole.

Field/Trip Blanks

During the investigation, two soil trip blanks and one water trip blank was placed in the esky during sampling and transported back to the laboratory.

The soil trip blanks analysis results were all less than the PQLs with the exception of chromium, lead and zinc with maximum reported concentrations of 4mg/kg, 5mg/kg and 2mg/kg respectively. Low level metals concentrations are typical in washed sand which is utilised as blank material. In JKE's experience, the concentrations reported were consistent with background concentrations in a sand matrix and were not indicative of cross-contamination. On this basis, cross contamination between samples that may have significance for data validity did not occur.

The detectable concentration of light fraction TRH is most likely attributed to trihalomethanes. 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).

Rinsates

The detectable concentration of light fraction TRH is most likely attributed to the use of plastic containers as outlined in the laboratory QA/QC review below. The sample did not identify any hydrocarbon profile of concern.

The detectable concentrations of copper and zinc were only marginally above the laboratory PQLs and are most likely attributed to the presence of low-level heavy metals in potable water. As all results of heavy metals were below the SAC, it is considered that the potential for cross-contamination to have occurred was low.

Trip Spikes

The results ranged from 90% to 110% 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 minor non-conformances:

- The positive TRH (C_{10}-C_{40}) result in the rinsate sample FR101-HA, was due to a single peak with no hydrocarbon profile that is consistent with the use of plastic containers;
- The laboratory RPD acceptance criteria were exceeded for TP111 (0-0.1) for copper, chromium and zinc; therefore, a triplicate result was issued;
- Low spike recovery was obtained for some elements. This was likely due to matrix interference. However, an acceptable spike recovery was obtained for the control sample;
- Samples sent for additional analysis (Lab report 35818-A) were out of holding time for pH and electrical conductivity (EC) analysis; and
- Sample TP108 (0-0.1) sent for additional analysis (Lab report 35818-B) was outside of the recommended holding time for some analytes.

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.

There was only one groundwater monitoring event undertaken for the investigation. On this basis there is some uncertainty around the representativeness of the groundwater data, particularly during different climatic conditions and after wet/dry periods. However, given the low contaminant concentrations reported, the site history and the surrounding land uses, this is not considered to alter the conclusions of the investigation.

Appendix H: Field Work Documents

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	Campbelltown Catholic Club
Project:	Proposed Development
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW
Job Number:	E36287BL

PID

Make: MINIRAE LITE	Model: RAE	Unit: 2	Date of last factory calibration: 19/1/24
Date of calibration: 17/5/24		Name of Calibrator: OB	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100.5 ppm		Error in measured reading: ± 0.5 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

Make: Honeywell	Model: MINIRAE Lite +	Unit: 4	Date of last factory calibration: 25/1/24
Date of calibration: 21/5/24		Name of Calibrator: OB	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100.4 ppm		Error in measured reading: ± 0.4 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Campbelltown Catholic Club		
Project:	Proposed Development		
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW		
Job Number:	E36287BL		
DISSOLVED OXYGEN			
Make: YSI4		Model:	
Date of calibration: 20/05/24		Name of Calibrator: OB	
Span value: 70% to 130%			
Measured value: 100%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI4		Model:	
Date of calibration: 20/05/24		Name of Calibrator: OB	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 02/25	Lot No: CC280923
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 11/24	Lot No: CB2665
Measured reading of Buffer 1: 7.08			
Measured reading of Buffer 2: 4.00			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI4		Model:	
Date: 20/05/24	Name of Calibrator: OB		Temperature: 18 °C
Calibration solution: Conductivity standard		Expiry date: 10/24	Lot No: 08111023
Theoretical conductivity at temperature (see solution container): 1224 µS/cm			
Measured conductivity: 1205 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI4		Model:	
Date of calibration: 20/05/24		Name of Calibrator: AD	
Calibration solution: ORP test Solution		Expiry date: 09/28	Lot No: 9289
Theoretical redox value: 240mV			
Measured redox reading: 240.0 mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

Client:	Campbelltown Catholic Club	**Job No.:**	**E36287BL**
Project:	Proposed Development	**Well No.:**	MW1
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW	**Depth (m):**	18.04

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Dev pump/bailer	**SWL – Before (m):**	4.15
Date:	20/05/24	**Time – Before:**	12:51pm
Undertaken By:	OB/AD	**SWL – After (m):**	8.70m
Total Vol. Removed:	85	**Time – After:**	1:57pm
PID Reading (ppm):	0.2		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2.5	21.6	5.1	1525	7.64	199.6
7.5	21.5	1.5	1550	7.67	192.2
10	21.7	1.1	1559	7.68	189.8
12.5	22.0	0.9	1571	7.69	184.1
15	22.2	0.9	1584	7.68	178.8
20	22.1	0.8	1615	7.62	174.0
25	21.3	2.3	1470	7.63	165.0
30	21.4	2.6	1550	7.66	160.6
35	21.2	1.1	1554	7.57	154.9
40	20.9	4.0	1571	7.70	130.2
45	20.8	2.4	1624	7.55	125.6
50	20.8	1.5	1757	7.35	118.9
55	20.9	2.2	1741	7.42	117.4
60	21.2	5.1	1709	7.60	115.3
65	21.1	4.9	1738	7.46	115.3
70	21.0	4.2	955	7.46	115.1
75	20.7	1.5	2774	6.93	-35.9
80	20.7	2.1	1993	7.26	-1.7
85	20.8	5.0	1947	7.41	16.7
	>3 well	volumes	developed		

Comments:Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI Used: 4 High silt load, recharge observed

Tested By:	OB x AD	**Remarks:** - Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date Tested:	20/5/24	
Checked By:	HL	
Date:	30/5/2024	

JKEnvironments

Client:	Campbelltown Catholic Club	**Job No.:**	E36287BL
Project:	Proposed Development	**Well No.:**	MW2
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW	**Depth (m):**	16.1m

WELL FINISH DETAILS

Gatic Cover ☒ | Standpipe ☐ | Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Per Pump + bailer	**SWL – Before (m):**	2.29
Date:	20/5/24	**Time – Before:**	2:31pm
Undertaken By:	OB + AT	**SWL – After (m):**	15.50
Total Vol. Removed:	70L	**Time – After:**	15:30
PID Reading (ppm):	0.2		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.75	21.6	1.2	3669	6.79	95.3
5	20.3	0.3	7343	6.38	-9.4
10	20.3	0.2	7203	6.45	-21.0
15	20.5	0.2	6662	6.49	-15.6
20	20.8	0.2	6521	6.47	-8.3
25	20.9	0.4	7239	6.38	6.7
30	21.2	0.3	6859	6.50	-6.0
35	20.9	0.4	7221	6.43	-12.9
40	20.7	0.2	7444	6.39	-15.0
45	20.5	0.5	7801	6.32	5.6
50	20.5	0.3	7385	6.39	-14.6
55	20.6	1.1	8104	6.31	-4.4
60	20.3	3.2	7980e	6.36	19.1
65	20.0	4.0	5062	6.47	13.8
70	20.0	1.3	7961	6.33	16.8

well pumped effectively dry

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI Used: 4

m-H silt load, 1-m recharge, brown

Tested By:	OB + AT	**Remarks:** - Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date Tested:	20/5/24	
Checked By:	HL	
Date:	30/5/2024	

16
2.29
13.71 X

JKEnvironments

Client:	Campbelltown Catholic Club	**Job No.:**	E36287BL
Project:	Proposed Development	**Well No.:**	MW101
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW	**Depth (m):**	6m

WELL FINISH DETAILS

Gatic Cover ☒ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	–	**SWL – Before (m):**	5.04
Date:	20/5/24	**Time – Before:**	–
Undertaken By:	OB + AD	**SWL – After (m):**	–
Total Vol. Removed:	–	**Time – After:**	–
PID Reading (ppm):	89.3		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
	well effectively dry				

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI Used: 4

Tested By:	OB + AD	**Remarks:**
Date Tested:	20/5/24	- Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Checked By:	HL	
Date:	30/5/2024	

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	Campbelltown Catholic Club
Project:	Proposed Development
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW
Job Number:	E36287BL

PID

Make: MiniRaeLite+	Model: PGM7300	Unit: PID3	Date of last factory calibration: 13/02/24
Date of calibration: 27/05/24		Name of Calibrator: AD	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 101.6 ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Campbelltown Catholic Club		
Project:	Proposed Development		
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW		
Job Number:	E36287BL		
DISSOLVED OXYGEN			
Make: YSI4		Model:	
Date of calibration: 27/05/24		Name of Calibrator: AD	
Span value: 70% to 130%			
Measured value: 120%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI4		Model:	
Date of calibration: 27/05/24		Name of Calibrator: AD	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 08/24	Lot No: CB3110
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 05/25	Lot No: CB2665
Measured reading of Buffer 1: 7.07			
Measured reading of Buffer 2: 4.02			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI4		Model:	
Date: 27/05/24	Name of Calibrator: AD		Temperature: 11.2 °C
Calibration solution: conductivity standard		Expiry date: 04/25	Lot No: DB111023
Theoretical conductivity at temperature (see solution container): 1035 µS/cm			
Measured conductivity: 1026 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI4		Model:	
Date of calibration: 27/05/24		Name of Calibrator: AD	
Calibration solution: ORPTest Solution		Expiry date: 09/28	Lot No: 9289
Theoretical redox value: 240mV			
Measured redox reading: 239.9 mV		Measured reading Acceptable (Yes/No):	

101.6ppm CAL
120%

JKEnvironments

Client:	Campbelltown Catholic Club	Job No.:	E36287BL
Project:	Proposed Development	Well No.:	MW1
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW	Depth (m):	18.04

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	4.44m
Date:	27/05/24	Time – Before:	8:45am
Undertaken By:	AD	Total Vol Removed:	~4.5L
Pump Program No:	–	PID (ppm):	0.1

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
8:54	4.61	0.5		19.3	4.9	1533	7.67	161.4
8:58	4.72	1.0		20.0	4.6	1578	7.66	142.3
9:02	4.79	2.0		20.3	4.6	1596	7.66	131.3
9:06	4.80	2.5		20.0	4.5	1593	7.66	122.0
9:10	4.80	3.0		20.0	4.5	1586	7.67	115.7
9:14	4.80	3.5		20.0	4.4	1591	7.67	109.8
			Started sampling					

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 1 x HNO3 plastic, x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 4 WDUP101

Tested By: ~~Jared Lim~~ Alexis Diodati	**Remarks:**
Date Tested: 27/05/24	- Steady state conditions
Checked By: HL	- difference in the pH less than 0.2 units, difference in conductivity less than 10%
Date: 30/5/2024	10% and SWL stable/not in drawdown

JKEnvironments

Client:	Campbelltown Catholic Club	**Job No.:**	E36287BL
Project:	Proposed Development	**Well No.:**	MW2
Location:	3 Old Menangle Road, CAMPBELLTOWN, NSW	**Depth (m):**	16.1

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	2.13
Date:	27/05/24	**Time – Before:**	9:52am
Undertaken By:	AD	**Total Vol Removed:**	
Pump Program No:		**PID (ppm):**	3.2

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:00	2.28	0.5		20.0	1.0	5157	6.36	101.7
10:04	2.44	1.0		20.1	0.6	7420	6.36	81.7
10:08	2.54	1.5		20.2	0.4	7591	6.36	74.3
10:12	2.62	2.0		20.1	0.4	7697	6.36	68.8
10:16	2.63	2.5		19.7	0.3	7698	6.36	64.4
10:20	2.63	3.0		19.5	0.3	7695	6.37	61.7
10:24	2.63	3.5		19.5	0.3	7740	6.37	60.0
			Started sampling					

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Sampling Containers Used: 2 **x glass amber,** 2 **x BTEX vials,** 1 **x HNO3 plastic, x H2SO4 plastic,** 1 **x unpreserved plastic**

YSI used: WDUP102

Tested By: ~~Jarod Lim~~ Alexis Diodati

Date Tested: 27/05/24

Checked By: HL

Date: 30/5/2024

Remarks:

- Steady state conditions
- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown

Appendix I: Site Analysis and Quality Plan (SAQP)

Appendix I: SAQP

REPORT TO

CAMPBELLTOWN CATHOLIC CLUB

ON

SAMPLING ANALYSIS AND QUALITY PLAN FOR DETAILED SITE INVESTIGATION

FOR

PROPOSED CAMPBELLTOWN CATHOLIC CLUB INDEPENDENT LIVING

AT

3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Date: 16 May 2024

Ref: E36287PLrpt2-SAQP

JKEnvironments

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Report prepared by:

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For and on behalf of
JKE
PO BOX 976
NORTH RYDE BC NSW 1670

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E36287PLrpt2-SAQP	Final Report	16 May 2024

This Report (which includes all attachments and annexures) has been prepared by JKE for the Client, and is intended for the use only by that Client.

This Report has been prepared pursuant to a contract between JKE and the Client and is therefore subject to:
a) JKE's proposal in respect of the work covered by the Report;
b) The limitations defined in the client's brief to JKE; and
c) The terms of contract between JKE and the Client, including terms limiting the liability of JKE.

If the Client, or any person, provides a copy of this Report to any third party, such third party must not rely on this Report, except with the express written consent of JKE which, if given, will be deemed to be upon the same terms, conditions, restrictions and limitations as apply by virtue of (a), (b), and (c) above.

Any third party who seeks to rely on this Report without the express written consent of JKE does so entirely at their own risk and to the fullest extent permitted by law, JKE accepts no liability whatsoever, in respect of any loss or damage suffered by any such third party.

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World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

Campbelltown Catholic Club ('the client') commissioned JK Environments (JKE) to prepare a Sampling Analysis and Quality Plan (SAQP) for the Detailed Site Contamination Investigation (DSI) to be undertaken by JKE for the proposed Campbelltown Catholic Club Independent Living 3 Old Menangle Road, Campbelltown, 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 Site Investigation (PSI) at the site. A summary of this information is included in Section 2.

1.1 Proposed Development Details

From the supplied architectural drawings (Ref. 20220099, Drawing No. AD-DA097 to AD-DA103 & AD-DA107, all Revision C) prepared by Scott Carver, we understand the proposed development will include construction of an eight-storey building over three basement levels. Due to the sloping nature of the site (i.e. down to the north-east), excavation will be required to depths of approximately 9.3m below ground level (BGL) at the north-eastern end, and 12mBGL at the south-western end with potentially localised deeper excavations of up to 2m depth, required for any lift-over run pits.

Two ramps will be constructed in the western corner of the proposed basement to provide access to the neighbouring two-level basement to the north-west. An Onsite Detention (OSD) tank will also be installed immediately behind the north-eastern basement wall. On-grade roadways, footpaths, outdoor spaces and landscaped garden areas will surround the proposed building. The existing single storey building (i.e. 'Emily Cottage') located in the eastern corner of the site will be retained. Proposed development plans are included in the appendices.

1.2 Aims and Objectives

The primary aim of the DSI is to characterise the soil and groundwater contamination conditions in accessible areas to assess site risks in relation to contamination and establish whether remediation is required. The 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 soil and groundwater contamination conditions via implementation of a sampling and analysis program;
- Document an iteration and review of the conceptual site model (CSM);
- 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

The SAQP has been prepared generally in accordance with a JKE proposal (Ref: EP59795BLrev1) of 15 February 2024 and written acceptance from the client dated 3 May 2024.

The scope of work included review of the PSI 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 PSI was previously undertaken by JKE in 2023[3]. The PSI consisted of a review of site history information and soil sampling from two borehole locations. The PSI site history review identified the following potential contamination sources/AEC:

- Fill material;
- Historical Agricultural Use;
- Use of Pesticides; and
- Hazardous Building Material.

The PSI encountered fill material to depths of approximately 0.5m and 0.8m below existing ground level (BGL) underlain by natural clay to depths of approximately 2.6mBGL and 7.1mBGL. Siltstone bedrock was encountered in both boreholes beneath the natural soil and extended to the termination depth.

Bonded asbestos in the form of Fibre Cement Fragments (FCF) was encountered at the surface in the western portion of the site. The FCF were removed as part of the PSI, however the presence of fill and FCF at the site indicated that there is a potential for asbestos containing materials to be present within the fill soil at the site. The soil laboratory results did not report any other contaminants above the site assessment criteria (SAC).

The conclusions of the PSI recommended undertaking a DSI to characterise the site contamination conditions. The DSI would include additional sampling designed to better characterise the site contamination conditions via implementation of a SAQP.

The PSI did not identify any historical land uses and potential sources of contamination that would preclude the proposed development. However, following was recommended to better assess the risks associated with potential contamination at the site:

- A SAQP should be prepared prior to the commencement of the DSI;
- A DSI should be undertaken to address the data gaps outlined in the PSI, characterise the site contamination conditions and establish whether the site is suitable for the proposed development, or whether remediation is required; and
- A hazardous building materials survey should be undertaken prior to demolition of the buildings. Following demolition of the buildings (and preferably prior to removal of the hardstand), an asbestos clearance certificate should be obtained.

[3] JKE, (2023). *Report to Campbelltown Catholic Club on Preliminary Site Investigation for Proposed Campbelltown Catholic Club Independent Living at 3 Old Menangle Road, Campbelltown, NSW.* (Ref: E36287BLrpt) (referred to as PSI)

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Campbelltown Catholic Club Limited
Site Address:	3 Old Menangle Road, Campbelltown, NSW
Lot & Deposited Plan:	Part of Lot 10 in DP1134526 Lot 3 in DP 193040 Lot 4 in DP193040 Lot 61 in DP 997095
Current Land Use:	Residential and commercial
Proposed Land Use:	Residential (Independent Aged Care)
Local Government Area:	Campbelltown City Council
Current Zoning:	MU1: Mixed Use
Site Area (m^2) (approx.):	4,500m^2
RL (AHD in m) (approx.):	70-73
Geographical Location (decimal degrees) (approx.):	Latitude: -34.073776 Longitude: 150.807578
Site Location Plan:	Figure 1
Proposed Sampling Location Plan:	Figure 2a

2.3 Site Description and Summary of Site Inspection

The site is located in a predominantly commercial and residential area of Campbelltown and is bound by Camden Road along the north to north-eastern boundary and Old Menangle Road along the southern boundary. The site is located approximately 75m to the west of Fishers Ghost Creek which is a tributary to the larger Bow Bowing Creek.

The regional topography is characterised by a north facing hillside that falls towards Bow Bowing Creek. The site is located near the two of the hillside and slopes down towards the north and north-east at a gradient of approximately 2-3°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

A walkover inspection of the site was undertaken by JKE on 19 October 2023. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken. Key observations are summarised below:

- At the time of the inspection, the south-west portion of the site was occupied by a residential property (lots 3 & 4 in DP193040) with a single storey house and surrounding grassed lawns. The central and north-east portions of the site (part of Lot 10 in DP1134526) was used for the storage of shipping containers in the south and also made up a small area of the adjoining Catholic Club car park in the north, which was partially paved with concrete and asphaltic concrete (AC) at the surface. The south-eastern corner of the site was occupied by the heritage site 'Emily House' (Lot 61 in DP997035) which consisted of the heritage cottage surrounded by grassed and vegetated lawns;

- The existing building appeared to be in good condition and were mostly of brick, sandstone and timber construction. Potential asbestos containing fibre cement lining was identified to the external eave and awning linings of the residential building in the south-west corner. The roof tiles of the original portion of Emily House were also noted as potentially containing asbestos;
- The asphaltic pavement and concrete paved car park in the north-east corner of the site appeared in good condition with no visible cracking or staining noted at the time of the inspection;
- During the inspection, two fibre cement fragments (FCF1 and FCF2) were identified along the western boundary of the site adjacent the existing residential building;
- The land in the north-east portion of the site surrounding Emily Cottage appeared to be slightly raised approximately 0.25m above the street level along Camden Road. This area may have been historically filled. The site overall appears to have been cut and/or filled to compensate for the overall slope of the site and create a level surface for the existing developments;
- Surface water was presumed to flow in sympathy with the overall gradient of the site towards the north and north-east. Drainage pits were noted in the surrounding car park to the west and north that were connected to the local stormwater system; and
- Native and exotic shrubs and large trees were present across the site, in ground and within small landscaped areas. No signs of stress or dieback were identified at the time of the inspection.

2.4 Surrounding Land Use

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

- North – Campbelltown Catholic Club car park and Camden Road. Kashigaya Park beyond;
- South – Old Menangle Road and the Campbelltown Arts Centre;
- East – Camden Road and carpark; and
- West – Campbelltown Catholic Club car park and visitors' information centre.

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 PSI 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 and Hydrogeology

2.6.1 Regional Geology

Regional geological information was reviewed for the PSI. The information was sourced from the Lotsearch report, which indicated that the site is underlain by Alluvium, which typically consists of unconsolidated alluvial clay, silty, sand and gravel deposits. The Lotsearch report also indicated the land immediately to the south of the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite.

2.6.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an ASS risk area according to the risk maps prepared by the Department of Land and Water Conservation.

ASS information presented in the Lotsearch report indicated that the site is not located within an ASS risk area.

2.6.3 Hydrogeology

Hydrogeological information reviewed for the PSI indicated that the regional aquifer on-site and, in the areas, immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There was a total of 27 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 580m from the site. This was utilised for monitoring purposes;
- The majority of the bores were registered for monitoring purposes;
- There were no nearby bores (i.e. within 2,000m) registered for domestic or irrigation uses; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of approximately 7.6-8.0mBGL, underlain by siltstone or shale bedrock. Standing water level (SWL) in the bores ranged from approximately 3.0mBGL to 6.2mBGL.

The information reviewed for the PSI indicates that the subsurface conditions at the site are expected to consist of moderate to high permeability (alluvial) soils overlying relatively deep bedrock. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable under these conditions, however the use of groundwater is not proposed as part of the development. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur.

Considering the local topography and surrounding land features, JKE anticipate groundwater to flow towards the north or north-east.

2.7 Receiving Water Bodies

The site location and regional topography indicates that excess surface water flows have the potential to enter Fishers Ghost Creek located approximately 75m to the east of the site, which is tributary to the larger Bow Bowing Creek. This water body is considered to be a potential receptor.

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. The boreholes drilled for the PSI identified fill to a maximum depth of approximately 0.8mBGL.	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.
Historical agricultural use – The site appears to have been used for grazing and/or agricultural purposes. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/ demolition of various structures. Irrigation pipes made from asbestos cement may also be associated with this AEC.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos JKE note that OCPs only became commercially available in the 1940s. Prior to this time pesticides were predominantly heavy metal compounds.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site. The PSI identified roofing material on Emily’s Cottage that may contain asbestos. The historical aerial photographs indicated that demolition of various residential buildings and structures has occurred in the north-east corner of the site prior to 1994.	Asbestos, lead and PCBs ACM in the form of FCF was detected at the site during the PSI.

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	Potential mechanisms for contamination include: • Fill material – importation of impacted material, 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material); • Historical agricultural use – 'top-down' and spills (e.g. application of pesticides, refuelling or repairing machinery, and other activities at the ground surface level); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); and • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas).
Affected media	Soil has been identified as the potentially affected medium. The potential for groundwater impacts is considered to be relatively low. However, groundwater will need to be considered as the proposed development is likely to intercept the groundwater table as part of the basement excavation.
Receptor identification	Human receptors include site occupants/users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in Fisher Ghost Creek.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption 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 and basements.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed basement and/or building (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; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems.

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 PSI and CSM 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 by completing a DSI, 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 of the laboratory results above the site assessment criteria?
- 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?

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 and groundwater;
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining, and groundwater physiochemical parameters;
- Laboratory analysis of soils, fibre cement (where identified) and groundwater samples for the CoPC identified in the CSM. Groundwater analysis will not include pesticides or PCBs as these are not CoPC in groundwater at this stage; 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 (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 between 20th and 27th May 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.

Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values has not been undertaken due to the spatial distribution of the data (i.e. non-probabilistic sampling plan). For the DSI, the individual results will be assessed as either above or below the SAC.

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 were not established as the sample plan is not probabilistic.

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 PSI findings, 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 13 locations as shown on the attached Figure 2. This number of locations meets the minimum sampling density for hotspot identification, as outlined in the NSW EPA Sampling Design Part 1 – Application (2022)[4] contaminated land guidelines. However, we note that the sampling plan is non-probabilistic and therefore does not aim to evaluate/detect hotspots with 95% confidence as per the intent of this aspect of the guidelines.
Sampling Plan	The sampling locations will be placed on an approximate 20m grid-based sampling plan or as close as reasonably practical in consideration of site access.

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

Aspect	Input
	This sampling plan is considered suitable to make an assessment of potential risks associated with the AEC and CoPC identified in the CSM.
Set-out and Sampling Equipment	Sampling locations will be set out using a hand-held GPS unit or tape measure. 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 drill rig (spiral flight augers and SPT sampling methods) and using an excavator (sampling from the excavator bucket).
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 be 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 borehole logs; • Each sample will be weighed using an electronic scale; • 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 (where soil is exposed at the surface), then each distinct fill profile thereafter, with a minimum of one sample per 1m depth of each fill profile.

Aspect	Input
	A calibration/check of the accuracy of the scale used for weighing the FCF will be undertaken using a set of calibration weights. Calibration/check records are maintained on file by JKE. The scale used to weigh the 10L samples will not be calibrated, however this is not considered significant as this method of providing a weight for the bulk sample is considered to be considerably more accurate than applying a nominal soil density conversion.
Decontamination 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 Groundwater Sampling Plan and Methodology

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

Table 4-2: Proposed Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater monitoring wells have previously been installed in BH1 (MW1) and BH2 (MW2) by our geotechnical division JK Geotechnics (JKG) during the PSI. A third groundwater well will be installed in BH101 (MW101) to supplement the existing wells. The well will be positioned to establish background groundwater conditions at the site. Considering the topography and the location of the nearest down-gradient water body, MW1 is considered to be in the up-gradient area of the site to target off-site sources of contamination and is expected to provide an indication of groundwater flowing onto (beneath) the site from the south. While MW101 and MW2 are considered to be in the down-gradient area of the site and expected to provide an indication of groundwater flowing across (beneath) the site and beyond the down-gradient site boundaries to the north and north-east.
Monitoring Well Installation Procedure	The monitoring well construction details will be documented on the appropriate borehole logs. The monitoring well will be installed to depths of approximately 6.0mBGL or prior refusal. The well will generally be constructed as follows: • 32mm diameter Class 18 PVC (machine slotted screen) installed in the lower section of the well to intersect groundwater; • 32mm diameter Class 18 PVC casing installed in the upper section of the well (screw fixed), with the rubber o-ring removed to limit interference for PFAS sampling; • A 2mm sand filter pack used around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug used on top of the sand pack to seal the well; and • A gatic cover installed at the surface with a concrete plug to limit the inflow of surface water. The monitoring well installation, including the screen lengths, is considered suitable for assessment of general groundwater quality with regards to Table 5 in Schedule B2 of NEPM 2013.

Aspect	Input
Monitoring Well Development	The monitoring wells will be developed after installation using an electric peristaltic pump. During development, the following parameters will be monitored using calibrated field instruments: • SWL using an electronic dip meter; and • pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter. Steady state conditions are considered to have been achieved when the difference in the pH measurements is less than 0.2 units, the difference in conductivity is less than 10%, and when the SWL is not in drawdown. In the event that groundwater in-flow is relatively slow, the development will continue until the wells are effectively dry. The field monitoring records and calibration data will be included in the DSI report.
Groundwater Sampling	The monitoring wells will be allowed to recharge for approximately five to seven days after development. Prior to sampling, the monitoring wells will be checked for the presence of Light Non-Aqueous Phase Liquids (LNAPL) using an inter-phase probe electronic dip meter. The monitoring well head space will be checked for VOCs using a calibrated PID unit. The samples will be obtained using a peristaltic pump/disposable plastic bailer. During sampling, the following parameters will be monitored using calibrated field instruments: • SWL using an electronic dip meter; and • pH, temperature, EC, DO and Eh using a YSI Multi-probe water quality meter. Steady state conditions is considered to have been achieved when the difference in the pH measurements is less than 0.2 units, the difference in conductivity is less than 10%, and when the SWL was not in drawdown. Groundwater samples will be obtained directly from the single use PVC tubing and placed in the sample containers. Duplicate samples are to be obtained by alternate filling of sample containers. This technique is adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling will be transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring record and calibration data will be included in the DSI report.
Decontaminant and Sample Preservation	The pump and inter-phase probe electronic dip meter will be decontaminated between monitoring wells using potable water (with rags and scrubbing brush), followed by a rinse with potable water. The groundwater sampling process utilises a peristaltic pump and single-use tubing, therefore no decontamination procedure for the sampling is considered necessary. The samples will be preserved with reference to the analytical requirements and placed in an insulated container with ice or ice bricks. On completion of the fieldwork, the samples may be temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

4.4 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 4-3: 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 13 selected soil samples for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH/BTEX; OCP; OPP; and PCBs;
- Up to 13 selected soil samples (500mL) for asbestos using laboratory quantification (gravimetric) methods;
- Up to six selected natural soil samples for heavy metals; PAHs; TRH; and BTEX;
- Up to two targeted soil samples will be analysed for pH; CEC; and clay content for the calculation of EILs for selected metals;
- Targeted toxicity characteristic leachate procedure (TCLP) analysis for selected metals and PAHs for waste classification purposes; and
- Up to three groundwater samples for: heavy metals; TRH/BTEX; PAHs; pH; EC and hardness.

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 'residential with minimal opportunity for soil access' exposure scenario (HIL-B);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B). HSLs were 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)[5]; and
- Asbestos will be assessed against the HSL-B 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-B 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)[6]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.04% 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): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$ 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): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (g)}}{\text{Soil weight (g)}}$

[5] 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*

[6] 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. 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[7];
- 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)[8] 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)[9] 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.

[7] 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)

[8] 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

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

5.2 Groundwater

Groundwater data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[10]. Environmental values for the DSI include aquatic ecosystems, and human-health risks in non-use scenarios (vapour intrusion).

5.2.1 Human Health

- The NEPM (2013) HSLs are not applicable for this project as the proposed basement will intersect groundwater. On this basis, JKE have undertaken a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater. The assessment included selection of alternative Tier 1 criteria that are considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria are based on the following:
  - Australian Drinking Water Guidelines 2011 (updated 2021)[11] for BTEX compounds;
  - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[12] for petroleum hydrocarbons. We have conservatively adopted the value of 100µg/L for TRH F1 and F2;
  - USEPA Region 9 screening levels for naphthalene (threshold value for tap water); and
  - The use of the laboratory PQLs for other contaminants where there are no Australian guidelines.
- The ADWG 2011 will be multiplied by a factor of 10 to assess potential risks associated with incidental -type exposure to groundwater (e.g. with seepage water in the basement). These have been deemed as 'recreational' SAC.

5.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of fresh water species will be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[13]. The 99% trigger values will be adopted where required to account for bioaccumulation. Low and moderate reliability trigger values will also be adopted for some contaminants where high-reliability trigger values don't exist.

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[10] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination.*

[11] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

[12] World Health Organisation (WHO), (2008). *Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality* (referred to as WHO 2008)

[13] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

6 DSI REPORTING REQUIREMENTS

A DSI report is to be prepared presenting the results of the investigation, generally in accordance with the NSW EPA Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (2020)[14].

A copy of this SAQP will be attached as an appendix in the DSI and the DSI will include a summary of the SAQP/investigation section that will acknowledge compliance and/or any deviations to this plan.

[14] 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

Appendix I: SAQP

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

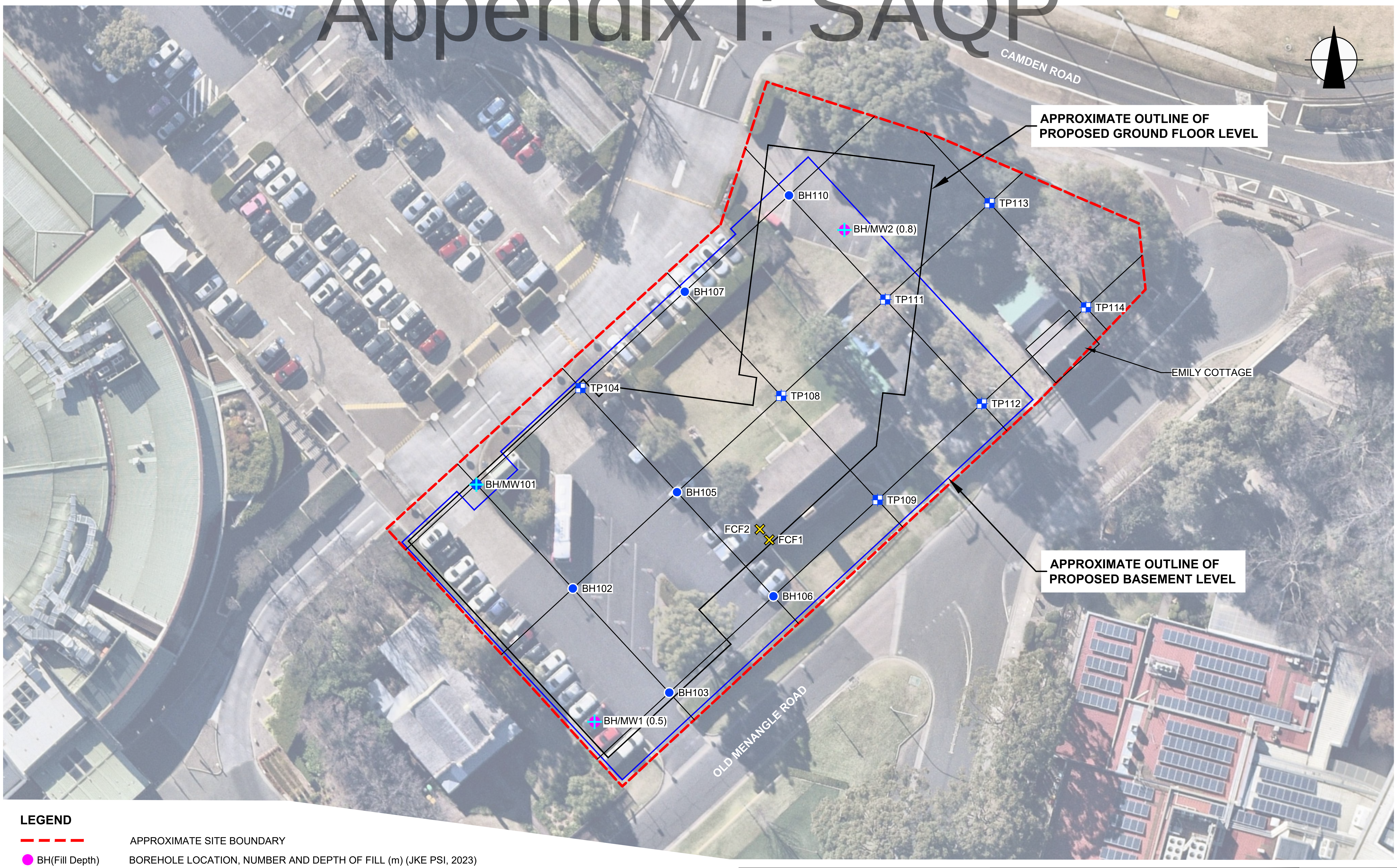
This plan should be read in conjunction with the Environmental report.

Title:	**SITE LOCATION PLAN**
Location:	3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW
Project No:	E36287BL
Figure No:	1

JKEnvironments

PLOT DATE: 16/11/2023 1:32:55 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG

Appendix I: SAQP



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE PSI, 2023)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
BH102	PROPOSED BOREHOLE LOCATION AND NUMBER
BH/MW101	PROPOSED BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION AND NUMBER
TP104	PROPOSED TEST PIT 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: 3 OLD MENANGLE ROAD, CAMPBELLTOWN, NSW

Project No: E36287BL

Figure No: 2a

JKEnvironments

PLOT DATE: 15/05/2024 3:29:16 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36287BL CAMPBELLTOWN\CAD\E36287BL.DWG

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)[15] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[16]. The NEPM (2013) is consistent with these documents.

A. <u>Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)</u>

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. <u>Precision</u>

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. <u>Accuracy</u>

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. <u>Representativeness</u>

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. <u>Completeness</u>

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;

[15] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[16] 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. <u>Comparability</u>

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. <u>Blanks</u>

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

H. <u>Matrix Spikes</u>

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%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result}) \times 100}{\text{Concentration of Spike Added}}$$

I. <u>Surrogate Spikes</u>

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. <u>Duplicates</u>

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 C: Guidelines and Reference Documents

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

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)

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)

National Health and Medical Research Council (NHMRC), (2021). National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011

NSW Department of Environment and Conservation, (2007). Guidelines for the Assessment and Management of Groundwater Contamination

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)

World Health Organisation (WHO), (2008). Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality

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

Appendix J: Guidelines and Reference Documents

Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). Acid Sulfate Soils Manual

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

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

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Heads of EPAs Australia and New Zealand (HEPA), (2020). PFAS National Environmental Management Plan Version 2.0 - January 2020

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

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